



# Short Form Catalog

May 2021

## DLA Certified JAN-JANS Hi-Rel Components

### Diodes

Switching

Zener

TC Zener

Current Regulators

Schottky Rectifiers

### Transistors

Small Signal

Medium & High Power

Darlington

### JFETS

Silicon Controlled Rectifiers

JANHC and JANKC Chips



# Diodes for Hi-Rel Applications

## Zener Diodes

Available in JAN, JANTX, JANTXV, and JANS levels per MIL-PRF-19500/435 in axial leaded, MELF and UB package styles.



Zener Diodes IN4099-1 to IN4135-1, IN4614-1 to IN4627-1		Nominal Zener Voltage, $V_Z$ (Note 2)	Zener Test Current, $I_{ZT}$	Maximum Zener Impedance $Z_{ZT}$ (Note 3)	Maximum Reverse Current, $I_R$ @ $V_R$	Maximum Noise Density, $N_D$ @ $I_{ZT}$	Maximum Zener DC Current, $I_{ZM}$
Types (Note 1)	Volts	$\mu A$	Ohms	$\mu A$	Volts	$\mu V / \sqrt{Hz}$	mA
IN4614-1, IN4614UR-1, UB	1.8	250	1200	3.5	1.0	1	120
IN4615-1, IN4615UR-1, UB	2.0	250	1250	2.5	1.0	1	110
IN4616-1, IN4616UR-1, UB	2.2	250	1300	2.0	1.0	1	100
IN4617-1, IN4617UR-1, UB	2.4	250	1400	1.0	1.0	1	95
IN4618-1, IN4618UR-1, UB	2.7	250	1500	1.0	1.0	1	90
IN4619-1, IN4619UR-1, UB	3.0	250	1600	1.0	1.0	1	87
IN4620-1, IN4620UR-1, UB	3.3	250	1650	3.5	1.5	1	85
IN4621-1, IN4621UR-1, UB	3.6	250	1700	3.5	2.0	1	83
IN4622-1, IN4622UR-1, UB	3.9	250	1650	2.5	2.0	1	80
IN4623-1, IN4623UR-1, UB	4.3	250	1600	2.0	2.0	1	77
IN4624-1, IN4624UR-1, UB	4.7	250	1550	5.0	2.0	1	75
IN4625-1, IN4625UR-1, UB	5.1	250	1500	5.0	3.0	2	70
IN4626-1, IN4626UR-1, UB	5.6	250	1400	5.0	4.0	4	65
IN4627-1, IN4627UR-1, UB	6.2	250	1200	5.0	5.0	5	61
IN4099-1, IN4099UR-1, UB	6.8	250	200	1.0	5.2	40	56
IN4100-1, IN4100UR-1, UB	7.5	250	200	1.0	5.7	40	51
IN4101-1, IN4101UR-1, UB	8.2	250	200	0.5	6.3	40	46
IN4102-1, IN4102UR-1, UB	8.7	250	200	0.5	6.7	40	44
IN4103-1, IN4103UR-1, UB	9.1	250	200	0.5	7.0	40	42
IN4104-1, IN4104UR-1, UB	10	250	200	0.5	7.6	40	38
IN4105-1, IN4105UR-1, UB	11	250	200	0.05	8.5	40	35
IN4106-1, IN4106UR-1, UB	12	250	200	0.05	9.2	40	32
IN4107-1, IN4107UR-1, UB	13	250	200	0.05	9.9	40	29
IN4108-1, IN4108UR-1, UB	14	250	200	0.05	10.7	40	27
IN4109-1, IN4109UR-1, UB	15	250	100	0.05	11.4	40	25
IN4110-1, IN4110UR-1, UB	16	250	100	0.05	12.2	40	24
IN4111-1, IN4111UR-1, UB	17	250	100	0.05	13.0	40	22
IN4112-1, IN4112UR-1, UB	18	250	100	0.05	13.7	40	21
IN4113-1, IN4113UR-1, UB	19	250	150	0.05	14.5	40	20
IN4114-1, IN4114UR-1, UB	20	250	150	0.01	15.2	40	19
IN4115-1, IN4115UR-1, UB	22	250	150	0.01	16.8	40	17
IN4116-1, IN4116UR-1, UB	24	250	150	0.01	18.3	40	16
IN4117-1, IN4117UR-1, UB	25	250	150	0.01	19.0	40	15
IN4118-1, IN4118UR-1, UB	27	250	150	0.01	20.5	40	14
IN4119-1, IN4119UR-1, UB	29	250	200	0.01	21.3	40	14
IN4120-1, IN4120UR-1, UB	30	250	200	0.01	22.8	40	13
IN4121-1, IN4121UR-1, UB	33	250	200	0.01	25.1	40	12
IN4122-1, IN4122UR-1, UB	36	250	200	0.01	27.4	40	11
IN4123-1, IN4123UR-1, UB	39	250	200	0.01	29.7	40	9.8
IN4124-1, IN4124UR-1, UB	43	250	250	0.01	32.7	40	8.9
IN4125-1, IN4125UR-1, UB	47	250	250	0.01	35.8	40	8.1
IN4126-1, IN4126UR-1, UB	51	250	300	0.01	38.8	40	7.5
IN4127-1, IN4127UR-1, UB	56	250	300	0.01	42.6	40	6.7
IN4128-1, IN4128UR-1, UB	60	250	400	0.01	45.6	40	6.4
IN4129-1, IN4129UR-1, UB	62	250	500	0.01	47.1	40	6.1
IN4130-1, IN4130UR-1, UB	68	250	700	0.01	51.7	40	5.6
IN4131-1, IN4131UR-1, UB	75	250	700	0.01	57.0	40	5.1
IN4132-1, IN4132UR-1, UB	82	250	800	0.01	62.4	40	4.6
IN4133-1, IN4133UR-1, UB	87	250	1000	0.01	66.2	40	4.4
IN4134-1, IN4134UR-1, UB	91	250	1200	0.01	69.2	40	4.2
IN4135-1, IN4135UR-1, UB	100	250	1500	0.01	76.0	40	3.0

Electrical specifications @  $T_A = +25^\circ C$  (unless otherwise specified).

NOTE 1: The JEDEC type numbers shown have a  $\pm 5\%$  tolerance on nominal Zener Voltage. The suffix C is used to identify  $\pm 2\%$  and suffix D is used to identify  $\pm 1\%$ .

NOTE 2: Zener voltage is measured with the device junction in thermal equilibrium at an ambient temperature of  $25^\circ C \pm 3^\circ C$ .

NOTE 3: Zener impedance is derived by superimposing on  $I_{ZT}$  A 60 Hz rms a.c. current equal to 10% of  $I_{ZT}$ .

# Diodes for Hi-Rel Applications



Available in JAN, JANTX and JANTXV per MIL-PRF-19500/437 in both axial leaded and MELF package styles.

## Low Noise Zener Diodes IN5518B-I to IN5546B-I

Types (Note 1)	Nominal Zener Voltage $V_Z @ I_Z$ (Note 2)	Zener Test Current $I_Z$	Maximum Zener Impedance B, C, D Suffix $Z_{ZT} @ I_Z$ (Note 3)	Maximum Reverse Current $I_R = \text{Volts}$	B, C, D, Suffix Maximum Zener DC Current $I_{ZM}$	B, C, D, Suffix Maximum Noise Density @ $I_Z = 250 \text{ mA ND}$	Regulation Factor $\Delta V_Z$	Low $V_Z$ Current $I_{ZL}$		
	Volts	mA	Ohms	$\mu\text{A dc}$	NON & A- Suffix	B- C- D- Suffix	mA dc	$\mu\text{V} / \sqrt{\text{Hz}}$	Volts	mA dc
IN5518B-I, IN5518BUR-I	3.3	20	26	5.0	0.90	1.0	115	0.5	0.90	2.0
IN5519B-I, IN5519BUR-I	3.6	20	24	3.0	0.90	1.0	105	0.5	0.90	2.0
IN5520B-I, IN5520BUR-I	3.9	20	22	1.0	0.90	1.0	98	0.5	0.85	2.0
IN5521B-I, IN5521BUR-I	4.3	20	18	3.0	1.0	1.5	88	0.5	0.75	2.0
IN5522B-I, IN5522BUR-I	4.7	10	22	2.0	1.5	2.0	81	0.5	0.60	1.0
IN5523B-I, IN5523BUR-I	5.1	5.0	26	2.0	2.0	2.5	75	0.5	0.65	0.25
IN5524B-I, IN5524BUR-I	5.6	3.0	30	2.0	3.0	3.5	68	1.0	0.30	0.25
IN5525B-I, IN5525BUR-I	6.2	1.0	30	1.0	4.5	5.0	61	1.0	0.20	0.01
IN5526B-I, IN5526BUR-I	6.8	1.0	30	1.0	5.5	6.2	56	1.0	0.10	0.01
IN5527B-I, IN5527BUR-I	7.5	1.0	35	0.5	6.0	6.8	51	2.0	0.05	0.01
IN5528B-I, IN5528BUR-I	8.2	1.0	40	0.5	6.5	7.5	46	4.0	0.05	0.01
IN5529B-I, IN5529BUR-I	9.1	1.0	45	0.1	7.0	8.2	42	4.0	0.05	0.01
IN5530B-I, IN5530BUR-I	10.0	1.0	60	0.05	8.0	9.1	38	4.0	0.10	0.01
IN5531B-I, IN5531BUR-I	11.0	1.0	80	0.05	9.0	9.9	35	5.0	0.20	0.01
IN5532B-I, IN5532BUR-I	12.0	1.0	90	0.05	9.5	0.8	32	10	0.20	0.01
IN5533B-I, IN5533BUR-I	13.0	1.0	90	0.01	10.5	11.7	29	15	0.20	0.01
IN5534B-I, IN5534BUR-I	14.0	1.0	100	0.01	11.5	12.6	27	20	0.20	0.01
IN5535B-I, IN5535BUR-I	15.0	1.0	100	0.01	12.5	13.5	25	20	0.20	0.01
IN5536B-I, IN5536BUR-I	16.0	1.0	100	0.01	13.0	14.4	24	20	0.20	0.01
IN5537B-I, IN5537BUR-I	17.0	1.0	100	0.01	14.0	15.3	22	20	0.20	0.01
IN5538B-I, IN5538BUR-I	18.0	1.0	100	0.01	15.0	16.2	21	20	0.20	0.01
IN5539B-I, IN5539BUR-I	19.0	1.0	100	0.01	16.0	17.1	20	20	0.20	0.01
IN5540B-I, IN5540BUR-I	20.0	1.0	100	0.01	17.0	18.0	19	20	0.20	0.01
IN5541B-I, IN5541BUR-I	22.0	1.0	100	0.01	18.0	19.8	17	20	0.25	0.01
IN5542B-I, IN5542BUR-I	24.0	1.0	100	0.01	20.0	21.6	16	20	0.30	0.01
IN5543B-I, IN5543BUR-I	25.0	1.0	100	0.01	21.0	22.4	15	20	0.35	0.01
IN5544B-I, IN5544BUR-I	28.0	1.0	100	0.01	23.0	25.2	14	20	0.40	0.01
IN5545B-I, IN5545BUR-I	30.0	1.0	100	0.01	24.0	27.0	13	20	0.45	0.01
IN5546B-I, IN5546BUR-I	33.0	1.0	100	0.01	28.0	29.7	12	20	0.50	0.01

Electrical specifications @  $T_A = +25^\circ\text{C}$  (unless otherwise specified).

NOTE 1: No Suffix type numbers are  $\pm 20\%$  with guaranteed limits for only  $V_Z$ ,  $I_R$ , and  $V_F$ . Units with "A" suffix are  $\pm 10\%$  with guaranteed limits for  $V_Z$ ,  $I_R$ , and  $V_F$ . Units with guaranteed limits for all six parameters are indicated by a "B" suffix for  $\pm 5.0\%$  units, "C" suffix for  $\pm 2.0\%$  and "D" suffix for  $\pm 1.0\%$ .

NOTE 2: Zener voltage is measured with the device junction in thermal equilibrium at an ambient temperature of  $25^\circ\text{C} \pm 3^\circ\text{C}$ .

NOTE 3: Zener impedance is derived by superimposing on  $I_{ZT}$  A 60 Hz rms a.c. current equal to 10% of  $I_{ZT}$ .



Available in JAN, JANTX and JANTXV per MIL-PRF-19500/127 in both axial leaded and MELF package styles.

## Zener Diodes IN746A-I - IN759A-I, IN4370A-I - IN4372A-I

Types (Note 1)	Nominal Zener Voltage $V_Z @ I_Z$ (Note 2)	Zener Test Current $I_Z$ (Note 2)	Maximum Zener Impedance $Z_{ZT} @ I_Z$ (Note 3)	Maximum Reverse Current $I_R @ V_R$	Maximum Zener Current $I_{ZM}$	
	Volts	mA	Ohms ( $\Omega$ )	$\mu\text{A}$	Volts	mA
IN4370A-I, IN4370AUR-I	2.4	20	30	100	1.0	155
IN4371A-I, IN4371AUR-I	2.7	20	30	60	1.0	140
IN4372A-I, IN4372AUR-I	3.0	20	29	30	1.0	125
IN746A-I, IN746AUR-I	3.3	20	24	5	1.0	120
IN747A-I, IN747AUR-I	3.6	20	22	3	1.0	110
IN748A-I, IN748AUR-I	3.9	20	20	2	1.0	100
IN749A-I, IN749AUR-I	4.3	20	18	2	1.0	90
IN750A-I, IN750AUR-I	4.7	20	15	5	1.5	85
IN751A-I, IN751AUR-I	5.1	20	14	5	2.0	75
IN752A-I, IN752AUR-I	5.6	20	8	5	2.5	70
IN753A-I, IN753AUR-I	6.2	20	3	5	3.5	65
IN754A-I, IN754AUR-I	6.8	20	3	2	4.0	60
IN755A-I, IN755AUR-I	7.5	20	4	2	5.0	55
IN756A-I, IN756AUR-I	8.2	20	5	1	6.0	50
IN757A-I, IN757AUR-I	9.1	20	6	1	7.0	45
IN758A-I, IN758AUR-I	10.0	20	7	1	8.0	40
IN759A-I, IN759AUR-I	12.0	20	10	1	9.0	35

Electrical specifications @  $T_A = +25^\circ\text{C}$  (unless otherwise specified).

NOTE 1: Zener voltage tolerance on "A" suffix is  $\pm 5\%$ . No Suffix denotes  $\pm 10\%$  tolerance, "C" suffix denotes  $\pm 2\%$  tolerance and "D" suffix denotes  $\pm 1\%$  tolerance.

NOTE 2: Zener voltage is measured with the device junction in thermal equilibrium at an ambient temperature of  $25^\circ\text{C} \pm 3^\circ\text{C}$ .

NOTE 3: Zener impedance is derived by superimposing on  $I_{ZT}$  A 60 Hz rms a.c. current equal to 10% of  $I_{ZT}$ .

# Diodes for Hi-Rel Applications

Available in JAN, JANTX, JANTXV, and JANS levels per MIL-PRF-19500/533 in axial leaded, MELF and UB package styles.



DO-35



DO-213AA



UB

## Zener Diodes IN6309 to IN6349

	Nominal Zener Voltage, $V_Z$ (Note 2)	Zener Test Current, $I_{ZT}$	Maximum Zener Impedance, $Z_{ZT}$ (Note 3)		Maximum Reverse Current, $I_R @ V_R$	Maximum Noise Density, $N_b @ I_{ZT}$	Maximum Zener DC Current, $I_{ZM}$
Types (Note 1)	Volts	mA	Ohms	$\mu A$	Volts	$\mu V / \sqrt{Hz}$	mA
IN6309, IN6309US	2.4	20	30	100	1.0	1	177
IN6310, IN6310US	2.7	20	30	60	1.0	1	157
IN6311, IN6311US	3.0	20	29	30	1.0	1	141
IN6312, IN6312US	3.3	20	27	5	1.0	1	128
IN6313, IN6313US	3.6	20	25	3	1.0	1	117
IN6314, IN6314US	3.9	20	23	2	1.0	1	108
IN6315, IN6315US	4.3	20	20	2	1.0	1	99
IN6316, IN6316US	4.7	20	17	5	1.5	1	90
IN6317, IN6317US	5.1	20	14	5	2.0	1	83
IN6318, IN6318US	5.6	20	8	5	2.5	2	76
IN6319, IN6319US	6.2	20	3	5	3.5	5	68
IN6320, IN6320US	6.8	20	3	2	4.0	5	63
IN6321, IN6321US	7.5	20	4	2	5.0	5	57
IN6322, IN6322US	8.2	20	5	1	6.0	20	52
IN6323, IN6323US	9.1	20	6	1	7.0	40	47
IN6324, IN6324US	10	20	6	1	8.0	80	43
IN6325, IN6325US	11	20	7	1	8.5	100	39
IN6326, IN6326US	12	20	7	1	9.0	100	35
IN6327, IN6327US	13	9.5	8	0.05	9.9	100	33
IN6328, IN6328US	15	8.5	10	0.05	11.0	100	28
IN6329, IN6329US	16	7.8	12	0.05	12.0	100	27
IN6330, IN6330US	18	7.0	14	0.05	14.0	100	24
IN6331, IN6331US	20	6.2	18	0.05	15.0	100	21
IN6332, IN6332US	22	5.6	20	0.05	17.0	100	19
IN6333, IN6333US	24	5.2	24	0.05	18.0	100	18
IN6334, IN6334US	27	4.6	27	0.05	21.0	100	16
IN6335, IN6335US	30	4.2	32	0.05	23.0	100	14
IN6336, IN6336US	33	3.8	40	0.05	25.0	100	13
IN6337, IN6337US	36	3.4	50	0.05	27.0	100	12
IN6338, IN6338US	39	3.2	55	0.05	30.0	100	11
IN6339, IN6339US	43	3.0	65	0.05	33.0	80	9.9
IN6340, IN6340US	47	2.7	75	0.05	36.0	80	9
IN6341, IN6341US	51	2.5	85	0.05	39.0	80	8.3
IN6342, IN6342US	56	2.2	100	0.05	43.0	80	7.6
IN6343, IN6343US	68	2.0	125	0.05	47.0	80	6.8
IN6344, IN6344US	75	1.8	155	0.05	52.0	80	6.3
IN6345, IN6345US	82	1.7	180	0.05	56.0	80	5.7
IN6346, IN6346US	91	1.5	220	0.05	62.0	80	5.2
IN6347, IN6347US	100	1.4	270	0.05	69.0	80	4.7
IN6348, IN6481US	110	1.3	340	0.05	76.0	80	4.3
IN6349, IN6349US	120	1.1	500	0.05	84.0	80	3.9

Electrical specifications @  $T_A = +25^\circ C$  (unless otherwise specified).

NOTE 1: The JEDEC type numbers shown have a  $\pm 5\%$  tolerance on nominal Zener Voltage. The suffix C is used to identify  $\pm 2\%$ ; and suffix D is used to identify  $\pm 1\%$ .

NOTE 2: Zener voltage is measured with the device junction in thermal equilibrium at an ambient temperature of  $25^\circ C \pm 3^\circ C$ .

NOTE 3: Zener impedance is derived by superimposing on  $I_{ZT}$  A 60 Hz rms a.c. current equal to 10% of  $I_{ZT}$ .

# Diodes for Hi-Rel Applications

Available in JAN, JANTX, and JANTXV levels per MIL-PRF-19500/115 in axial and MELF package styles.



## Zener Diodes IN3016B-I to IN3045B-I

	Nominal Zener Voltage, $V_Z$ (Note 1)	Zener Test Current, $I_{ZT}$	Maximum Impedance $Z_{ZT}$ @ $I_{ZT}$ (Note 2)	Maximum Impedance $Z_{ZK}$ @ $I_{ZK}$ (Note 3)	Maximum Reverse Leakage Current † @ $V_R$	Maximum Temp. Coeff. of Zener Voltage	Maximum Zener DC Current, $I_{ZM}$		
Types	Volts	mA	Ohms	Ohms ( $Z_{ZK}$ )	mA ( $I_{ZK}$ )	$\mu$ A	Volts	%/°C	mA
IN3016B-I	6.8	37	3.5	700	1.0	150	5.2	0.061	140
IN3017B-I	7.5	34	4.0	700	0.5	100	5.7	0.065	125
IN3018B-I	8.2	31	4.5	700	0.5	50	6.2	0.070	115
IN3019B-I	9.1	28	6	700	0.5	25	6.9	0.073	105
IN3020B-I	10	25	7	700	0.25	25	7.6	0.076	95
IN3021B-I	11	23	8	700	0.25	10	8.4	0.078	85
IN3022B-I	12	21	9	700	0.25	10	9.1	0.081	80
IN3023B-I	13	19	10	700	0.25	10	9.9	0.085	74
IN3024B-I	15	17	14	700	0.25	10	11.4	0.088	63
IN3025B-I	16	15.5	16	700	0.25	10	12.2	0.089	60
IN3026B-I	18	14	20	750	0.25	10	13.7	0.091	52
IN3027B-I	20	12.5	22	750	0.25	10	15.2	0.092	47
IN3028B-I	22	11.5	23	750	0.25	10	16.7	0.093	43
IN3029B-I	24	10.5	25	750	0.25	10	18.2	0.094	40
IN3030B-I	27	9.5	35	750	0.25	10	20.6	0.096	34
IN3031B-I	30	8.5	40	1000	0.25	10	22.8	0.098	31
IN3032B-I	33	7.5	45	1000	0.25	10	25.1	0.099	28
IN3033B-I	36	7.0	50	1000	0.25	10	27.4	0.100	26
IN3034B-I	39	6.5	60	1000	0.25	10	29.7	0.101	23
IN3035B-I	43	6.0	70	1500	0.25	10	32.7	0.102	21
IN3036B-I	47	5.5	80	1500	0.25	10	35.8	0.102	19
IN3037B-I	51	5.0	95	1500	0.25	10	38.8	0.103	18
IN3038B-I	56	4.5	110	2000	0.25	10	42.6	0.103	17
IN3039B-I	62	4.0	125	2000	0.25	10	47.1	0.104	15
IN3040B-I	68	3.7	150	2000	0.25	10	51.7	0.104	14
IN3041B-I	75	3.3	175	2000	0.25	10	56.0	0.105	12
IN3042B-I	82	3.0	200	3000	0.25	10	62.2	0.106	11
IN3043B-I	91	2.8	250	3000	0.25	10	69.2	0.108	10
IN3044B-I	100	2.5	350	3000	0.25	10	76.0	0.110	9.0
IN3045B-I	110	2.3	450	4000	0.25	10	83.6	0.110	8.3

Electrical specifications @  $T_A = +25^\circ\text{C}$  (unless otherwise specified) - JEDEC Registered Data.

† Not JEDEC Data

NOTE 1: Zener Voltage ( $V_Z$ ) is measured with junction in thermal equilibrium with still air at a temperature of 25 °C. The test currents ( $I_{ZT}$ ) at nominal voltages provide constant 0.25 watts.

NOTE 2: The Zener impedance is derived when a 60 cycle ac current having an rms value equal to 10% of the dc Zener current ( $I_{ZT}$  or  $I_{ZK}$ ) is superimposed on  $I_{ZT}$  or  $I_{ZK}$ . Zener impedance is measured at 2 points to ensure a sharp knee on the breakdown curve and to eliminate unstable units.

NOTE 3: These values of  $I_{ZM}$  may often be exceeded in the case of individual diodes. The values are calculated for a unit at the high voltage end of its tolerance range. Allowance has also been made for the rise in Zener voltage above  $V_{ZT}$  that results from the Zener impedance and the increase in junction temperature as a unit approaches thermal equilibrium at a dissipation of 1 watt. The  $I_{ZM}$  values shown for  $\pm 5\%$  tolerance units may be used with little error for the  $\pm 10\%$  tolerance units, but should be reduced by 7% to include a  $\pm 20\%$  tolerance unit near the high voltage end of its tolerance range.

# Diodes for Hi-Rel Applications

## Silicon Zener Diodes

IN957B-I thru IN986B-I. IN962B-I thru IN986B-I available in JAN, JANTX and JANTXV per MIL-PRF-19500/117 in both axial leaded and MELF package styles.



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DO-213AA

### Zener Diodes IN957B-I to IN986B-I

Types (Note 1)	Nominal Zener Voltage, $V_Z$ (Note 2)	Zener Test Current $I_{ZT}$	Maximum Zener Impedance $Z_{ZT} @ I_{ZT}$ (Note 3)	Maximum Zener Knee Impedance $Z_{ZK} @ I_{ZK}$ (Note 3)	Maximum DC Zener Current, $I_{ZM}$	Maximum Surge Current, $I_{ZSM}$	Maximum Reverse Leakage $I_R @ V_R = 25^\circ\text{C}$	Maximum Temperature Coefficient, $\alpha_{VZ}$		
	Volts	mA	Ohms	Ohms	mA	mA	$\mu\text{A}$	%/°C		
IN957B-I, IN957BUR-I	6.8	18.5	4.5	700	1.0	55	300	150	5.2	+0.050
IN958B-I, IN958BUR-I	7.5	16.5	5.5	700	.5	50	275	75	5.7	+0.058
IN959B-I, IN959BUR-I	8.2	15.0	6.5	700	.5	45	250	50	6.2	+0.065
IN960B-I, IN960BUR-I	9.1	14.0	7.5	700	.5	41	225	25	6.9	+0.068
IN961B-I, IN961BUR-I	10	12.5	8.5	700	.25	38	200	10	7.6	+0.075
IN962B-I, IN962BUR-I	11	11.5	9.5	700	.25	35	590	1.0	8.4	+0.073
IN963B-I, IN963BUR-I	12	10.5	11.5	700	.25	32	540	1.0	9.1	+0.076
IN964B-I, IN964BUR-I	13	9.5	13	700	.25	30	500	0.5	9.9	+0.079
IN965B-I, IN965BUR-I	15	8.5	16	700	.25	26	433	0.5	11	+0.082
IN966B-I, IN966BUR-I	16	7.8	17	700	.25	25	406	0.5	12	+0.083
IN967B-I, IN967BUR-I	18	7.0	21	750	.25	21	361	0.5	14	+0.085
IN968B-I, IN968BUR-I	20	6.2	25	750	.25	19	325	0.5	15	+0.086
IN969B-I, IN969BUR-I	22	5.6	29	750	.25	17	295	0.5	17	+0.087
IN970B-I, IN970BUR-I	24	5.2	33	750	.25	16	271	0.5	18	+0.088
IN971B-I, IN971BUR-I	27	4.6	41	750	.25	14	240	0.5	21	+0.090
IN972B-I, IN972BUR-I	30	4.2	49	1000	.25	13	216	0.5	23	+0.091
IN973B-I, IN973BUR-I	33	3.8	58	1000	.25	12	197	0.5	25	+0.092
IN974B-I, IN974BUR-I	36	3.4	70	1000	.25	11	180	0.5	27	+0.093
IN975B-I, IN975BUR-I	39	3.2	80	1000	.25	9.1	166	0.5	30	+0.094
IN976B-I, IN976BUR-I	43	3.0	93	1000	.25	8.8	151	0.5	33	+0.095
IN977B-I, IN977BUR-I	47	2.7	105	1500	.25	7.9	138	0.5	36	+0.095
IN978B-I, IN978BUR-I	51	2.5	125	1500	.25	7.4	127	0.5	39	+0.096
IN979B-I, IN979BUR-I	56	2.2	150	2000	.25	6.9	116	0.5	43	+0.096
IN980B-I, IN980BUR-I	62	2.0	185	2000	.25	6.0	105	0.5	47	+0.097
IN981B-I, IN981BUR-I	68	1.8	230	2000	.25	5.5	95	0.5	52	+0.097
IN982B-I, IN982BUR-I	75	1.7	270	2000	.25	5.1	86	0.5	56	+0.098
IN983B-I, IN983BUR-I	82	1.5	330	3000	.25	4.6	79	0.5	62	+0.098
IN984B-I, IN984BUR-I	91	1.4	400	3000	.25	4.2	71	0.5	69	+0.099
IN985B-I, IN985BUR-I	100	1.3	500	3000	.25	3.7	65	0.5	76	+0.110
IN986B-I, IN986BUR-I	110	1.1	750	4000	.25	3.3	59	0.5	84	+0.110

Electrical specifications @  $T_A = +25^\circ\text{C}$  (unless otherwise specified).

NOTE 1: The JEDEC type numbers shown (B Suffix) have a  $\pm 5\%$  tolerance on nominal Zener Voltage. The suffix A is used to identify  $\pm 10\%$  tolerance; suffix C is used to identify  $\pm 2\%$ ; and suffix D is used to identify  $\pm 1\%$ ; no suffix indicates  $\pm 20\%$ .

NOTE 2: Zener voltage is measured with the device junction in thermal equilibrium at an ambient temperature of  $25^\circ\text{C} \pm 3^\circ\text{C}$ .

NOTE 3: Zener impedance is derived by superimposing on  $I_{ZT}$  A 60 Hz rms a.c. current equal to 10% of  $I_{ZT}$ .

## Temperature Compensated (TC) Zener Reference Diodes 6.4V Nominal Zener Voltage

Available in JAN, JANTX, JANTXV and JANS levels to MIL-PRF-19500 slash sheets /159 and /452 in both axial leaded and MELF packages. Other features include metallurgically bonded and double plug construction.



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TC Zener Diodes IN4565UR to IN4584UR, -I	Zener Test Current $I_Z$	Effective Temperature Coefficient	Voltage Temperature Stability ( $\Delta V_Z / Z_T$ ) (Note 1)	Temperature Range	Maximum Dynamic Zener Impedance (Note 2)
	mA	% / °C	mV	°C	Ohms ( $\Omega$ )
Types 6.4V $\pm$ 5% (Note 1)					
IN4565-I, IN4565UR-I	0.5	0.01	48	0 to +75°C	200
IN4565A-I, IN4565AUR-I	0.5	0.01	100	-55 to +100°C	200
IN4566-I, IN4566UR-I	0.5	0.005	24	0 to +75°C	200
IN4566A-I, IN4566AUR-I	0.5	0.005	50	-55 to +100°C	200
IN4567-I, IN4567UR-I	0.5	0.002	10	0 to +75°C	200
IN4567A-I, IN4567AUR-I	0.5	0.002	20	-55 to +100°C	200
IN4568-I, IN4568UR-I	0.5	0.001	5	0 to +75°C	200
IN4568A-I, IN4568AUR-I	0.5	0.001	10	-55 to +100°C	200
IN4569-I, IN4569UR-I	0.5	0.0005	2.5	0 to +75°C	200
IN4569A-I, IN4569AUR-I	0.5	0.0005	5	-55 to +100°C	200
IN4570-I, IN4570UR-I	1.0	0.01	48	0 to +75°C	100
IN4570A-I, IN4570AUR-I	1.0	0.01	100	-55 to +100°C	100
IN4571-I, IN4571UR-I	1.0	0.005	24	0 to +75°C	100
IN4571A-I, IN4571AUR-I	1.0	0.005	50	-55 to +100°C	100
IN4572-I, IN4572UR-I	1.0	0.002	10	0 to +75°C	100
IN4572A-I, IN4572AUR-I	1.0	0.002	20	-55 to +100°C	100
IN4573-I, IN4573UR-I	1.0	0.001	5	0 to +75°C	100
IN4573A-I, IN4573AUR-I	1.0	0.001	10	-55 to +100°C	100
IN4574-I, IN4574UR-I	1.0	0.0005	2.5	0 to +75°C	100
IN4574A-I, IN4574AUR-I	1.0	0.0005	5	-55 to +100°C	100
IN4575-I, IN4575UR-I	2.0	0.01	48	0 to +75°C	50
IN4575A-I, IN4575AUR	2.0	0.01	100	-55 to +100°C	50
IN4576, IN4576UR	2.0	0.005	24	0 to +75°C	50
IN4576A, IN4576AUR-I	2.0	0.005	50	-55 to +100°C	50
IN4577-I, IN4577UR-I	2.0	0.002	10	0 to +75°C	50
IN4577A-I, IN4577AUR-I	2.0	0.002	20	-55 to +100°C	50
IN4578-I, IN4578UR-I	2.0	0.001	5	0 to +75°C	50
IN4578A-I, IN4578AUR-I	2.0	0.001	10	-55 to +100°C	50
IN4579-I, IN4579UR-I	2.0	0.0005	2.5	0 to +75°C	50
IN4579A-I, IN4579AUR-I	2.0	0.0005	5	-55 to +100°C	50
IN4580-I, IN4580UR-I	4.0	0.01	48	0 to +75°C	25
IN4580A-I, IN4580AUR-I	4.0	0.01	100	-55 to +100°C	25
IN4581-I, IN4581UR-I	4.0	0.005	24	0 to +75°C	25
IN4581A-I, IN4581AUR-I	4.0	0.005	50	-55 to +100°C	25
IN4582-I, IN4582UR-I	4.0	0.002	10	0 to +75°C	25
IN4582A-I, IN4582AUR-I	4.0	0.002	20	-55 to +100°C	25
IN4583-I, IN4583UR-I	4.0	0.001	5	0 to +75°C	25
IN4583A-I, IN4583AUR-I	4.0	0.001	10	-55 to +100°C	25
IN4584-I, IN4584UR-I	4.0	0.0005	2.5	0 to +75°C	25
IN4584A-I, IN4584AUR-I	4.0	0.0005	5	-55 to +100°C	25

Electrical specifications @ +25°C (unless otherwise specified).

NOTE 1: The maximum allowable change observed over the entire temperature range i.e., the diode voltage will not exceed the specified mV at any discrete temperature between the established limits, per JEDEC standard No. 5.

NOTE 2: Zener impedance is derived by superimposing on  $I_Z$  TA 60 Hz rms a.c. current equal to 10% of  $I_Z$ .

# Diodes for Hi-Rel Applications

## Current Regulators

Available in JAN, JANTX, JANTXV and JANS levels to MIL-PRF-19500/463 in axial leaded, MELF and UB packages.



Current Regulator Diode Series IN5283-I to IN5314-I, IN7041-I to IN7055-I	Regulator Current $I_p$ (mA) @ $V_s = 25V$			Maximum Dynamic Impedance @ $V_s = 25V$ $Z_s$ (M) (Note 1)	Minimum Knee Impedance @ $V_k = 6.0V$ $Z_k$ (M) (Note 2)	Maximum Limiting Voltage @ $I_L = 0.8 I_p$ (min) $V_L$ (Volts)	Peak Operating Voltage
	Nominal	Minimum	Maximum				Volts
IN5283-I, IN5283UR-I, UB	0.22	0.198	0.242	25.0	2.75	1.00	100
IN5284-I, IN5284UR-I, UB	0.24	0.216	0.264	19.0	2.35	1.00	100
IN5285-I, IN5285UR-I, UB	0.27	0.243	0.297	14.0	1.95	1.00	100
IN5286-I, IN5286UR-I, UB	0.30	0.270	0.330	9.0	1.60	1.00	100
IN5287-I, IN5287UR-I, UB	0.33	0.297	0.363	8.0	1.35	1.00	100
IN5288-I, IN5288UR-I, UB	0.39	0.351	0.429	4.10	1.000	1.05	100
IN5289-I, IN5289UR-I, UB	.043	0.387	0.473	3.30	0.870	1.05	100
IN5290-I, IN5290UR-I, UB	0.47	0.423	0.517	2.70	0.750	1.05	100
IN5291-I, IN5291UR-I, UB	0.56	0.504	0.616	1.90	0.560	1.10	100
IN5292-I, IN5292UR-I, UB	0.62	0.558	0.682	1.55	0.470	1.13	100
IN5293-I, IN5293UR-I, UB	0.68	0.612	0.748	1.35	0.400	1.15	100
IN5294-I, IN5294UR-I, UB	0.75	0.675	0.825	1.15	0.335	1.20	100
IN5295-I, IN5295UR-I, UB	0.82	0.738	0.902	1.00	0.290	1.25	100
IN5296-I, IN5296UR-I, UB	0.91	0.819	1.001	0.88	0.240	1.29	100
IN5297-I, IN5297UR-I, UB	1.00	0.900	1.100	0.80	0.205	1.35	100
IN5298-I, IN5298UR-I, UB	1.10	0.99	1.21	0.70	0.180	1.40	100
IN5299-I, IN5299UR-I, UB	1.20	1.08	1.32	0.64	0.155	1.45	100
IN5300-I, IN5300UR-I, UB	1.30	1.17	1.43	0.58	0.135	1.50	100
IN5301-I, IN5301UR-I, UB	1.40	1.26	1.54	0.54	0.115	1.55	100
IN5302-I, IN5302UR-I, UB	1.50	1.35	1.65	0.51	0.105	1.60	100
IN5303-I, IN5303UR-I, UB	1.60	1.44	1.76	0.475	0.092	1.65	100
IN5304-I, IN5304UR-I, UB	1.80	1.62	1.98	0.420	0.074	1.75	100
IN5305-I, IN5305UR-I, UB	2.00	1.80	2.20	0.395	0.061	1.85	100
IN5306-I, IN5306UR-I, UB	2.20	1.98	2.42	0.370	0.052	1.95	100
IN5307-I, IN5307UR-I, UB	2.40	2.16	2.54	0.345	0.044	2.00	100
IN5308-I, IN5308UR-I, UB	2.70	2.43	2.97	0.320	0.035	2.15	100
IN5309-I, IN5309UR-I, UB	3.00	2.70	3.30	0.300	0.029	2.25	100
IN5310-I, IN5310UR-I, UB	3.30	2.97	3.63	0.280	0.024	2.35	100
IN5311-I, IN5311UR-I, UB	3.60	3.24	3.96	0.265	0.020	2.50	100
IN5312-I, IN5312UR-I, UB	3.90	3.51	4.29	0.255	0.017	2.60	100
IN5313-I, IN5313UR-I, UB	4.30	3.87	4.73	0.245	0.014	2.75	100
IN5314-I, IN5314UR-I, UB	4.70	4.23	5.17	0.235	0.012	2.90	100
IN7048-I, IN7048UR-I, UB	5.10	4.59	5.61	100	4.0	3.67	80
IN7049-I, IN7049UR-I, UB	5.60	5.04	6.16	90	4.0	4.03	80
IN7050-I, IN7050UR-I, UB	6.20	5.58	6.82	80	3.0	4.46	70
IN7051-I, IN7051UR-I, UB	6.80	6.12	7.48	70	2.0	4.90	70
IN7052-I, IN7052UR-I, UB	7.50	6.75	8.25	50	1.5	5.40	60
IN7053-I, IN7053UR-I, UB	8.20	7.38	9.02	30	1.5	5.90	60
IN7054-I, IN7054UR-I, UB	9.10	8.19	10.01	20	1.0	6.55	50
IN7055-I, IN7055UR-I, UB	10.00	9.00	11.10	10	1.0	7.20	50

Electrical specifications @ +25°C (unless otherwise specified).

NOTE 1:  $Z_s$  is derived by superimposing a 90 Hz RMS signal equal to 10% of  $V_s$  on  $V_s$

NOTE 2:  $Z_k$  is derived by superimposing a 90 Hz RMS signal equal to 10% of  $V_k$  on  $V_k$

Available in chip form.

# Diodes for Hi-Rel Applications



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## TC Zener Diodes IN821 to IN828, -I IN821UR-IN828UR, -I

Types	Zener Voltage $V_Z @ I_{ZT}$	Zener Test Current $I_{ZT}$	Maximum Zener Impedance $Z_{ZT}$ (Note 1)	Voltage Temperature Stability, $\Delta V_Z$ , -55°C to +100°C (Note 2)	Effective Temperature Coefficient
	Volts	mA	Ohms ( $\Omega$ )	mV	% / °C
IN821-I, IN821UR-I	5.9—6.5	7.5	15	96	0.01
IN821A-I, IN821AUR-I	5.9—6.5	7.5	10	96	0.01
IN822-I, IN822UR-I †	5.9—6.5	7.5	15	96	0.01
IN823-I, IN823UR-I	5.9—6.5	7.5	15	48	0.005
IN823A-I, IN823AUR-I	5.9—6.5	7.5	10	48	0.005
IN824-I, IN824UR-I †	5.9—6.5	7.5	15	48	0.005
IN825-I, IN825UR-I	5.9—6.5	7.5	15	19	0.002
IN825A-I, IN825AUR-I	5.9—6.5	7.5	10	19	0.002
IN826-I, IN826UR-I	6.2—6.9	7.5	15	20	0.002
IN827-I, IN827UR-I	5.9—6.5	7.5	15	9	0.001
IN827A-I, IN827AUR-I	5.9—6.5	7.5	10	9	0.001
IN828-I, IN828UR-I	6.2—6.9	7.5	15	10	0.001
IN829-I, IN829UR-I	5.9—6.5	7.5	15	5	0.0005
IN829A-I, IN829AUR-I	5.9—6.5	7.5	10	5	0.0005

† Double Anode: Electrical Specifications Apply Under Both Bias Polarities.

Electrical specifications @ +25°C (unless otherwise specified).

NOTE 1: Zener impedance is derived by superimposing on  $I_{ZT}$  A 60 Hz rms a.c. current equal to 10% of  $I_{ZT}$ .

NOTE 2: The maximum allowable change observed over the entire temperature range i.e., the diode voltage will not exceed the specified mV at any discrete temperature between the established limits, per JEDEC standard No.5.

## Silicon Switching Diodes

Available in JAN, JANTX, JANTXV levels to MIL-PRF-19500 slash sheets 1116, 1144, 1231, and JAN, JANTX, JANTXV, and JANS 1578 & 1609 in both axial leaded and MELF packages. Other features include Metallurgically Bonded; Hermetically Sealed and Double Plug Construction.



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DO-213AA

## Switching Diodes IN3600, IN4150-I

Types	$V_{BR} I_R = 10 \mu A$	$V_{RWM}$	$I_{F1} V_A = 50 Vdc$ $T_A = 25^\circ C$	$I_{F2} V_A = 50 Vdc$ $T_A = 150^\circ C$	$C_{AC} f = 1 MHz$ AC signal = 50 mV (p-p)	$f_{tr} I_R = 10 - 100 mA$ $I_F = 10 - 100 mA$ $R_L = 100 \Omega$	$V_{R1} I_F = 1 mA dc$	$V_{R2} I_F = 10 mA dc$	$V_{R3} I_F = 50 mA dc$ (pulsed)	$V_{R4} I_F = 100 mA dc$ (pulsed)	$V_{R5} I_F = 200 mA dc$ (pulsed)			
	Volts	V(pk)	$\mu A dc$	$\mu A dc$	pF	nA	V dc min	V dc max	V dc min	V dc max	V dc min	V dc max	V dc min	V dc max
IN3600	75	50	0.1	100	2.5	4.0	0.54	0.62	0.66	0.74	0.76	0.86	0.82	0.92
IN4150-I, IN4150UR-I	75	50	0.1	100	2.5	4.0	0.54	0.62	0.66	0.74	0.76	0.86	0.82	0.92

Electrical specifications @ +25°C (unless otherwise specified).



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## Switching Diodes IN914 & IN4148-I

Types	$V_{BR} @ 100 \mu A$	$V_{RWM}$	$I_O$	$V_{R1} I_F = 10 mA$	$V_{R2} I_F = 50 mA$	$f_{tr} I_R = 10 mA$ $I_F = 10 mA$ $R_L = 100 \Omega$	$I_{R1} @ 20 Vdc$	$I_{R2} @ 75 Vdc$	$I_{R3} V_R = 20V$ $T_A = 150^\circ C$	$I_{R4} V_R = 20V$ $T_A = 150^\circ C$	Capacitance @ 0V	Capacitance @ 1.5V
	Volts	V(pk)	mA	V dc	V dc	nsec	nA	$\mu A$	$\mu A$	$\mu A$	pF	pF
IN914, IN914UR	100	75	75	0.8	1.2	5	25	0.5	35	75	4.0	2.8
IN4148-I, IN4148UR-I	100	75	200	0.8	1.2	5	35	0.5	35	75	4.0	2.8

Electrical specifications @ +25°C (unless otherwise specified).

# Diodes for Hi-Rel Applications



## Switching Diodes IN6638 Series

Types	$V_{BR} @ I_R$		$V_{RWM}$		$V_{FR} / I_F @ I_F = 200 \text{ mA}$		$C_{T1} V_R = 0.0V$		$C_{T2} V_R = 1.5V$		$f_{rr} I_R = 10 \text{ mA}$ $I_F = 10 \text{ mA}$		$V_{R1} V_R = V_{RWM}$		$I_{R2} V_R = 20V$ $T_A = 150^\circ C$		$I_{R3} V_R = 20V$ $T_A = 150^\circ C$		$I_{R4} V_R = V_{RWM}$		$V_F @ I_F$		$V_F @ I_F$ $T_A = -55^\circ C$		$f$
	V(pk)	$\mu A$	V(pk)	$\frac{V_{FR}}{V(pk)}$	$\tau_{rr}$ ns	pF	pF	ns	nA dc	nA dc	$\mu A$ dc	$\mu A$ dc	V dc min	V dc max	V dc max	V dc max	mA pulsed								
IN6638	150	100	125	5.0	20	2.5	2.0	4.5	35	500	50	100	-	1.1	1.2	1.2	200								
IN6639	100	10	75	5.0	10	2.5	-	4.0	-	100	-	90	-	1.2	1.3	500									
IN6640	75	10	50	5.0	10	2.5	-	4.0	-	100	-	90	0.54	0.62	-	1									
													0.76	0.86	-	50									
													0.82	0.92	-	100									
													0.87	1.0	1.1	200									
IN6641	75	10	50	5.0	10	3.0	-	5.0	-	100	-	90	-	1.1	1.2	200									
IN6642	100	100	75	5.0	20	5.0	2.8	5.0	25	500	50	100	-	1.0	-	10									
													-	1.2	1.2	100									
IN6643	75	100	50	5.0	20	5.0	2.8	6.0	50	500	75	100	-	1.0	-	10									
													-	1.2	1.4	100									

Electrical specifications @  $T_A = +25^\circ C$  (unless otherwise specified).



## Switching Diodes IN6638U Series

Types	$V_{BR} @ I_R$		$V_{RWM}$		$V_{FR} / I_F @ I_F = 200 \text{ mA}$		$C_{T1} V_R = 0.0V$		$C_{T2} V_R = 1.5V$		$f_{rr} I_R = 10 \text{ mA}$ $I_F = 10 \text{ mA}$		$I_{R1} V_R = V_{RWM}$		$I_{R2} V_R = 20V$ $T_A = 150^\circ C$		$I_{R3} V_R = 20V$ $T_A = 150^\circ C$		$I_{R4} V_R = V_{RWM}$		$V_F @ I_F$		$V_F @ I_F$ $T_A = -55^\circ C$		$f$
	V(pk)	$\mu A$	V(pk)	$\frac{V_{FR}}{V(pk)}$	$\tau_{rr}$ ns	pF	pF	ns	nA dc	nA dc	$\mu A$ dc	$\mu A$ dc	V dc min	V dc max	V dc max	V dc max	mA pulsed								
IN6638U and US	150	100	125	5.0	20	2.5	2.0	4.5	35	500	50	100	-	1.1	1.2	200									
IN6639U and US	100	10	75	5.0	10	2.5	-	4.0	-	100	-	90	-	1.2	1.3	500									
IN6640U and US	75	10	50	5.0	10	2.5	-	4.0	-	100	-	90	0.54	0.62	-	1									
													0.76	0.86	-	50									
													0.82	0.92	-	100									
													0.87	1.0	1.1	200									
IN6641U and US	75	10	50	5.0	10	3.0	-	5.0	-	100	-	90	-	1.1	1.2	200									
IN6642U, US and UB	100	100	75	5.0	20	5.0	2.8	5.0	25	500	50	100	-	1.0	-	10									
													-	1.2	1.2	100									
IN6643U and US	75	100	50	5.0	20	5.0	2.8	6.0	50	500	75	100	-	1.0	-	10									
													-	1.2	1.4	100									

Electrical specifications @  $T_A = +25^\circ C$  (unless otherwise specified).



## Switching Diodes IN4531

Types	$V_F$		$I_F$		$V_{BR}$		$f_{rr} I_R = 10 \text{ mA}$ $I_F = 10 \text{ mA}$ $f_{rec} = 100 \Omega$		$T_{RR} @ I_F = 50 \text{ mA}$		$V_{FR} @ I_F = 50 \text{ mA}$		Capacitance @ 0V		Capacitance @ 1.5V	
	Ambient ( $^\circ C$ )	$I_F$ mA	V dc max	Ambient ( $^\circ C$ )	V dc	A max	Ambient ( $^\circ C$ )	$I_R$ $\mu A$	V dc max	V dc max	nsec	nsec	V(pk)	pF	pF	
IN4531-I	25	10	0.8	25	20	0.025	25	100	100	25	5	20	5	4	2.8	
	25	100	1.2	25	75	0.500										
	150	10	0.8	150	20	35.0										
	-55	100	1.3	150	75	75.0										



## Switching Diodes IN4454-I

Types	$V_{BR} @ 5 \mu A$		$V_{RWM}$		$I_0$		$V_{T1} I_F = 10 \text{ mA}$		$V_{T2} I_F = 10 \text{ mA}$		$f_{rr}$		$I_{R1} @ 50 \text{ Vdc}$		$I_{R2} @ 75 \text{ Vdc}$ $T_A = 150^\circ C$		Capacitance @ 0V	
	Volts	V(pk)	mA	V dc	V dc	nsec	$\mu A$	$\mu A$	pF									
IN4454-I, IN4454UR-I	75	50	200	0.8	0.7	4	0.1	100	2.0									

# Diodes for Hi-Rel Applications

## Zener Diode Chip Series CD5518B – CD5546B

Types	Nominal Zener Voltage, $V_Z @ I_{ZT}$ (Note 1)	Zener-Test Current $I_{ZT}$	Maximum Zener Impedance, $Z_{ZT} @ I_{ZT}$ (Note 2)	Maximum Reverse Leakage Current, $I_R$	Maximum Reverse Leakage Current, $I_R$	Regulation Factor $V_Z$ (Note 3)	Low $V_Z$ Current, $I_{ZL}$
	Volts	mAdc	Ohms	mAdc	Volts	Volts	mAdc
CD5518B	3.3	20	26	5.0	1.0	0.90	2.0
CD5519B	3.6	20	24	3.0	1.0	0.90	2.0
CD5520B	3.9	20	22	1.0	1.0	0.90	2.0
CD5521B	4.3	20	18	3.0	1.5	0.75	2.0
CD5522B	4.7	10	22	2.0	2.0	0.60	1.0
CD5523B	5.1	5.0	26	2.0	2.5	0.65	0.25
CD5524B	5.6	3.0	30	2.0	3.5	0.30	0.25
CD5525B	6.2	1.0	30	1.0	5.0	0.20	0.01
CD5526B	6.8	1.0	30	1.0	6.2	0.10	0.01
CD5527B	7.5	1.0	35	0.5	6.8	0.05	0.01
CD5528B	8.2	1.0	40	0.5	7.5	0.05	0.01
CD5529B	9.1	1.0	45	0.1	8.2	0.05	0.01
CD5530B	10.0	1.0	60	0.05	9.1	0.10	0.01
CD5531B	11.0	1.0	80	0.05	9.9	0.20	0.01
CD5532B	12.0	1.0	90	0.05	10.8	0.20	0.01
CD5533B	13.0	.0	90	0.01	11.7	0.20	0.01
CD5534B	14.0	1.0	100	0.01	12.6	0.20	0.01
CD5535B	15.0	1.0	100	0.01	13.5	0.20	0.01
CD5536B	16.0	1.0	100	0.01	14.4	0.20	0.01
CD5537B	17.0	1.0	100	0.01	15.3	0.20	0.01
CD5538B	18.0	1.0	100	0.01	16.2	0.20	0.01
CD5539B	19.0	1.0	100	0.01	17.1	0.20	0.01
CD5540B	20.0	1.0	100	0.01	18.0	0.20	0.01
CD5541B	22.0	1.0	100	0.01	19.8	0.25	0.01
CD5542B	24.0	1.0	100	0.01	21.6	0.30	0.01
CD5543B	25.0	1.0	100	0.01	22.4	0.35	0.01
CD5544B	28.0	1.0	100	0.01	25.2	0.40	0.01
CD5545B	30.0	1.0	100	0.01	27.0	0.45	0.01
CD5546B	33.0	1.0	100	0.01	29.7	0.50	0.01

Electrical specifications @ +25°C (unless otherwise specified). **AVAILABLE IN JANHC AND JANCK PER MIL-PRF-19500/437.**

NOTE 1: Suffix "B" voltage range equals nominal Zener voltage,  $\pm 5\%$ . Suffix "A" equals  $\pm 10\%$ . "C" suffix =  $\pm 2\%$  and "D" suffix =  $\pm 1\%$ . No Suffix equals  $\pm 20\%$ . Zener voltage is read using a pulse measurement, 10 milliseconds maximum.

NOTE 2: Zener impedance is derived by superimposing on  $I_{ZT}$  a 60 Hz rms ac current equal to 10% of  $I_{ZT}$ .

NOTE 3:  $\Delta V_Z$  is the maximum difference between  $V_Z @ I_{ZT}$  and  $V_Z$  at  $I_{ZL}$  measured with the device junction in thermal equilibrium at an ambient temperature of  $+25^\circ \pm 3^\circ\text{C}$ .

## Zener Diode Chip Series CD4614 – CD4627

Types	Nominal Zener Voltage, $V_Z @ I_{ZT}$ (Note 1)	Zener-Test Current $I_{ZT}$	Maximum Zener Impedance, $Z_{ZT} @ I_{ZT}$ (Note 2)	Maximum Reverse Leakage Current, $I_R @ V_R$
	Volts	$\mu\text{A}$	Ohms	$\mu\text{A}$
CD4614	1.8	250	1200	7.5
CD4615	2.0	250	1250	5.0
CD4616	2.2	250	1300	4.0
CD4617	2.4	250	1400	2.0
CD4618	2.7	250	1500	1.0
CD4619	3.0	250	1600	0.8
CD4620	3.3	250	1650	7.5
CD4621	3.6	250	1700	7.5
CD4622	3.9	250	1650	5.0
CD4623	4.3	250	1600	4.0
CD4624	4.7	250	1550	10.0
CD4625	5.1	250	1500	10.0
CD4626	5.6	250	1400	10.0
CD4627	6.2	250	1200	10.0

Electrical specifications @ +25°C (unless otherwise specified). **AVAILABLE IN JANHC AND JANCK PER MIL-PRF-19500/435.**

NOTE 1: Zener voltage range equals nominal Zener voltage  $\pm 5\%$  for no suffix types. Zener voltage is read using a pulse measurement, 10 milliseconds maximum. "C" suffix =  $\pm 2\%$  and "D" suffix =  $\pm 1\%$ .

NOTE 2: Zener impedance is derived by superimposing on  $I_{ZT}$  a 60 Hz rms AC current equal to 10% of  $I_{ZT}$ .

# Diodes for Hi-Rel Applications

## TC Zener Diode Chip Series CD4565 – CD4584A

	Zener Test Current $I_{ZT}$	Effective Temperature Coefficient	Voltage Temperature Stability $\pm \Delta V_{ZT} / \Delta T$ Max (Note 1)	Temperature Range	Maximum Zener Impedance $Z_{ZT}$ (Note 2)
Types 6.4V $\pm 5\%$	mA	% / °C	Ohms	°C	Ohms
CD4565	0.5	0.01	48	0 to +75 °C	200
CD4565A	0.5	0.01	100	-55 to +100 °C	200
CD4566	0.5	0.005	24	0 to +75 °C	200
CD4566A	0.5	0.005	50	-55 to +100 °C	200
CD4567	0.5	0.002	10	0 to +75 °C	200
CD4567A	0.5	0.002	20	-55 to +100 °C	200
CD4568	0.5	0.001	5	0 to +75 °C	200
CD4568A	0.5	0.001	10	-55 to +100 °C	200
CD4569	0.5	0.0005	2.5	0 to +75 °C	200
CD4569A	0.5	0.0005	5	-55 to +100 °C	200
CD4570	1.0	0.01	48	0 to +75 °C	100
CD4570A	1.0	0.01	100	-55 to +100 °C	100
CD4571	1.0	0.005	24	0 to +75 °C	100
CD4571A	1.0	0.005	50	-55 to +100 °C	100
CD4572	1.0	0.002	10	0 to +75 °C	100
CD4572A	1.0	0.002	20	-55 to +100 °C	100
CD4573	1.0	0.001	5	0 to +75 °C	100
CD4573A	1.0	0.001	10	-55 to +100 °C	100
CD4574	1.0	0.0005	2.5	0 to +75 °C	100
CD4574A	1.0	0.0005	5	-55 to +100 °C	100
CD4575	2.0	0.01	48	0 to +75 °C	50
CD4575A	2.0	0.01	100	-55 to +100 °C	50
CD4576	2.0	0.005	24	0 to +75 °C	50
CD4576A	2.0	0.005	50	-55 to +100 °C	50
CD4577	2.0	0.002	10	0 to +75 °C	50
CD4577A	2.0	0.002	20	-55 to +100 °C	50
CD4578	2.0	0.001	5	0 to +75 °C	50
CD4578A	2.0	0.001	10	-55 to +100 °C	50
CD4579	2.0	0.0005	2.5	0 to +75 °C	50
CD4579A	2.0	0.0005	5	-55 to +100 °C	50
CD4580	4.0	0.01	48	0 to +75 °C	25
CD4580A	4.0	0.01	100	-55 to +100 °C	25
CD4581	4.0	0.005	24	0 to +75 °C	25
CD4581A	4.0	0.005	50	-55 to +100 °C	25
CD4582	4.0	0.002	10	0 to +75 °C	25
CD4582A	4.0	0.002	20	-55 to +100 °C	25
CD4583	4.0	0.001	5	0 to +75 °C	25
CD4583A	4.0	0.001	10	-55 to +100 °C	25
CD4584	4.0	0.0005	2.5	0 to +75 °C	25
CD4584A	4.0	0.0005	5	-55 to +100 °C	25

Electrical specifications @ +25 °C (unless otherwise specified). **AVAILABLE IN JANHC AND JANCK PER MIL-PRF-19500/452.**

NOTE 1: The maximum allowable change observed over the entire temperature range, i.e., the diode voltage will not exceed the specialized mV at any discrete temperature between the established limits, per JEDEC standard No.5.

NOTE 2: Zener impedance is derived by superimposing on  $I_{ZT}$  a 60 Hz rms ac current equal to 10% of  $I_{ZT}$ .

# Diodes for Hi-Rel Applications

## Zener Diode Chip Series CD4099 – CD4135

Types	Nominal Zener Voltage, $V_Z @ I_{ZT}$ (Note 1)	Zener-Test Current, $I_{ZT}$	Maximum Zener Impedance, $Z_{ZT} @ I_{ZT}$ (Note 2)	Maximum Reverse Leakage Current $I_R @ V_R$	Volts
CD4099	6.8	250	200	10.0	5.17
CD4100	7.5	250	200	10.0	5.70
CD4101	8.2	250	200	1.0	6.24
CD4102	8.7	250	200	1.0	6.61
CD4103	9.1	250	200	1.0	6.92
CD4104	10	250	200	1.0	7.60
CD4105	11	250	200	0.05	8.44
CD4106	12	250	200	0.05	9.12
CD4107	13	250	200	0.05	9.87
CD4108	14	250	200	0.05	10.65
CD4109	15	250	100	0.05	11.40
CD4110	16	250	100	0.05	12.15
CD4111	17	250	100	0.05	12.92
CD4112	18	250	100	0.05	13.67
CD4113	19	250	150	0.05	14.44
CD4114	20	250	150	0.01	15.20
CD4115	22	250	150	0.01	16.72
CD4116	24	250	150	0.01	18.25
CD4117	25	250	150	0.01	19.00
CD4118	27	250	150	0.01	20.46
CD4119	28	250	200	0.01	21.28
CD4120	30	250	200	0.01	22.80
CD4121	33	250	200	0.01	25.08
CD4122	36	250	200	0.01	27.38
CD4123	39	250	200	0.01	29.65
CD4124	43	250	250	0.01	32.56
CD4125	47	250	250	0.01	35.75
CD4126	51	250	300	0.01	38.76
CD4127	56	250	300	0.01	42.60
CD4128	60	250	400	0.01	45.60
CD4129	62	250	500	0.01	47.10
CD4130	68	250	700	0.01	51.68
CD4131	75	250	700	0.01	57.00
CD4132	82	250	800	0.01	62.32
CD4133	87	250	1000	0.01	66.12
CD4134	91	250	1200	0.01	69.16
CD4135	100	250	1500	0.01	76.00

Electrical specifications @ +25°C (unless otherwise specified). **AVAILABLE IN JANHC AND JANKC PER MIL-PRF-19500/435.**

NOTE 1: Zener voltage range equals nominal Zener voltage  $\pm 5\%$  for no suffix types. Zener voltage is read using a pulse measurement, 10 milliseconds maximum. "C" suffix =  $\pm 2\%$  and "D" suffix =  $\pm 1\%$ .

NOTE 2: Zener impedance is derived by superimposing on  $I_{ZT}$  a 60 Hz rms AC current equal to 10% of  $I_{ZT}$ .

# Diodes for Hi-Rel Applications

## Zener Diodes CD6309 to CD6349

Types (Note 1)	Nominal Zener Voltage, $V_Z$ (Note 2)	Zener Test Current, $I_Z$	Dynamic Impedance $Z_Z$ @ $I_Z$ (Note 3)	Dynamic Impedance $Z_{ZK}$ @ 250 $\mu$ A (Note 3)	Maximum Reverse Current, $I_R$ @ $V_R$	Voltage Reg $V_Z$ (reg) (Note 2)	Maximum Noise Density, $N_b$ @ $I_Z$	Maximum Zener DC Current, $I_{ZM}$
	Volts	mA	Ohms	Ohms	$\mu$ A	Volts	$\mu$ V / $\sqrt{\text{Hz}}$	mA
CD6309	2.4	20	30	1200	100	1.0	1	177
CD6310	2.7	20	30	1300	60	1.0	1	157
CD6311	3.0	20	29	1400	30	1.0	1	141
CD6312	3.3	20	27	1400	5	1.0	1	128
CD6313	3.6	20	25	1400	3	1.0	1	117
CD6314	3.9	20	23	1700	2	1.0	1	108
CD6315	4.3	20	20	1900	2	1.0	0.9	99
CD6316	4.7	20	17	1500	5	1.5	0.5	90
CD6317	5.1	20	14	1300	5	2.0	0.4	83
CD6318	5.6	20	8	1200	5	2.5	0.4	76
CD6319	6.2	20	3	800	5	3.5	0.3	68
CD6320	6.8	20	3	400	2	4.0	0.35	63
CD6321	7.5	20	4	400	2	5.0	0.4	57
CD6322	8.2	20	5	400	1	6.0	0.4	52
CD6323	9.1	20	6	500	1	7.0	0.5	47
CD6324	10	20	6	500	1	8.0	0.5	43
CD6325	11	20	7	550	1	8.5	0.5	39
CD6326	12	20	7	550	1	9.0	0.55	35
CD6327	13	9.5	8	550	0.05	9.9	0.55	33
CD6328	15	8.5	10	600	0.05	11.0	0.7	28
CD6329	16	7.8	12	600	0.05	12.0	0.75	27
CD6330	18	7.0	14	600	0.05	14.0	0.85	24
CD6331	20	6.2	18	500	0.05	15.0	0.95	21
CD6332	22	5.6	20	500	0.05	17.0	1.05	19
CD6333	24	5.2	24	500	0.05	18.0	1.15	18
CD6334	27	4.6	27	500	0.05	21.0	1.3	16
CD6335	30	4.2	32	500	0.05	23.0	1.45	14
CD6336	33	3.8	40	600	0.05	25.0	1.6	13
CD6337	36	3.4	50	600	0.05	27.0	1.75	12
CD6338	39	3.2	55	700	0.05	30.0	1.9	11
CD6339	43	3.0	65	800	0.05	33.0	2.1	9.9
CD6340	47	2.7	75	900	0.05	36.0	2.25	9
CD6341	51	2.5	85	1000	0.05	39.0	2.5	8.3
CD6342	56	2.2	100	1200	0.05	43.0	2.7	7.6
CD6343	62	2.0	125	1300	0.05	47.0	2.9	6.8
CD6344	68	1.8	155	1500	0.05	52.0	3.2	6.3
CD6345	75	1.7	180	1600	0.05	56.0	3.4	5.7
CD6346	82	1.5	220	1800	0.05	62.0	3.8	5.2
CD6347	91	1.4	270	2100	0.05	69.0	4.2	4.7
CD6348	100	1.3	340	2400	0.05	76.0	4.4	4.3
CD6349	110	1.1	500	2800	0.05	84.0	4.8	3.9

Electrical specifications @ +25 °C (unless otherwise specified). **AVAILABLE IN JANHC AND JANKC PER MIL-PRF-19500/533.**

NOTE 1: The JEDEC type numbers shown have a  $\pm 5\%$  tolerance on nominal Zener Voltage. The suffix C is used to identify  $\pm 2\%$ ; and suffix D is used to identify  $\pm 1\%$ .

NOTE 2:  $V_Z \text{ REG} = V_Z @ 50\% \text{ of } I_{ZM} \text{ minus } V_Z @ 10\% \text{ of } I_{ZM}$

NOTE 3: Zener impedance is derived by superimposing on  $I_{ZT}$  A 60 Hz rms a.c. current equal to 10% of  $I_{ZT}$ .

## Ultrafast Rectifiers

Ultrafast Rectifiers	$V_{WRM}$	$I_o$	$I_{SM}$	$I_R(\text{Max})$	$V_F$	$C_j @ 10V$	Package
	Volts	Amps	Amps	$\mu$ A	V @ $I_F = 6A$	pF	
VPTC06150	150	6	125	50	0.925	70	SMD22
VPTC06200	200	6	125	50	0.34	70	SMD22
VPTC06600	600	6	90	5	1.8	8	SMD22

# Diodes for Hi-Rel Applications

## Zener Diode Chip Series CD957B – CD986B

	Nominal Zener Voltage $V_Z$ (Note 1)	Zener Test Current $I_{ZT}$	Maximum Zener Impedance $Z_{ZT}$ @ $I_{ZT}$ (Note 2)	Maximum Zener Impedance $Z_{ZK}$ @ $I_{ZK}$ (Note 2)	Maximum DC Zener Current $I_{ZM}$	Maximum Reverse Leakage Current $I_R$ @ $V_R$		
Types	Volts	mA	Ohms	Ohms	mA	mA	$\mu$ A	Volts
CD957B	6.8	18.5	4.5	700	1.0	55	5.0	5.2
CD958B	7.5	16.5	5.5	700	0.5	50	5.0	5.7
CD959B	8.2	15.0	6.5	700	0.5	45	5.0	6.2
CD960B	9.1	14.0	7.5	700	0.5	41	5.0	6.9
CD961B	10	12.5	8.5	700	0.25	38	2.0	7.6
CD962B	11	11.5	9.5	700	0.25	32	1.0	8.4
CD963B	12	10.5	11.5	700	0.25	31	1.0	9.1
CD964B	13	9.5	13	700	0.25	28	0.5	9.9
CD965B	15	8.5	16	700	0.25	25	0.5	11
CD966B	16	7.8	17	700	0.25	24	0.5	12
CD967B	18	7.0	21	750	0.25	20	0.5	14
CD968B	20	6.2	25	750	0.25	18	0.5	15
CD969B	22	5.6	29	750	0.25	16	0.5	17
CD970B	24	5.2	33	750	0.25	15	0.5	18
CD971B	27	4.6	41	750	0.25	13	0.5	21
CD972B	30	4.2	49	1000	0.25	12	0.5	23
CD973B	33	3.8	58	1000	0.25	11	0.5	25
CD974B	36	3.4	70	1000	0.25	10	0.5	27
CD975B	39	3.2	90	1000	0.25	9.5	0.5	30
CD976B	43	3.0	93	1500	0.25	8.8	0.5	33
CD977B	47	2.7	105	1500	0.25	7.9	0.5	36
CD978B	51	2.5	125	1500	0.25	7.4	0.5	39
CD979B	56	2.2	150	2000	0.25	6.8	0.5	43
CD980B	62	2.0	185	2000	0.25	6.0	0.5	47
CD981B	68	1.8	230	2000	0.25	5.5	0.5	52
CD982B	75	1.7	270	2000	0.25	5.0	0.5	56
CD983B	82	1.5	330	3000	0.25	4.6	0.5	62
CD984B	91	1.4	400	3000	0.25	4.1	0.5	69
CD985B	100	1.3	500	3000	0.25	3.7	0.5	76
CD986B	110	1.1	750	4000	0.25	3.3	0.5	84

Electrical specifications @ +25°C (unless otherwise specified). **AVAILABLE IN JANHC AND JANKC PER MIL-PRF-19500/117.**

NOTE 1: Zener voltage range equals nominal voltage  $\pm$  5% for "B" Suffix. "A" Suffix denotes  $\pm$  10%. No Suffix denotes  $\pm$  20%. "C" suffix =  $\pm$  2% and "D" suffix =  $\pm$  1%. Zener voltage is read using a pulse measurement, 10 milliseconds maximum.

NOTE 2: Zener impedance is derived by superimposing on  $I_{ZT}$  a 60 Hz rms a.c. current equal to 10% of  $I_{ZT}$ .

## Schottky Diodes

	$V_{WRM}$	$I_O$	$I_{FSM}$	$f_r$	$V_F$	$C_T$	Package
Schottky Diodes	Volts	Amps	Amps	$\mu$ A	V @ $I_F = .1A$	pF	
IN5817-1*	20	1	25	50	0.32	70	DO-41/DO213AB
IN5819-1*	45	1	25	50	0.34	70	DO-41/DO213AB
IN5711UB*	50	0.033	-	0.2	0.41	2.0	UB

\* AVAILABLE IN JAN, JANTX, JANTXV AND JANS QUALITY LEVELS

## Schottky Chip

	$V_{(RR)}$	$I_O$	$I_{FSM}$	$f_r$	$V_F$	$C_T$	Package
Schottky Chip	Volts	mA	Amps	nA	V @ $I_F = .1A$	pF	
CD5711	70	33	-	200	0.41	2.0	Chip

ALSO AVAILABLE IN JANHC AND JANKC PER MIL-PRF-19500/444

# Diodes for Hi-Rel Applications

## Zener Diode Chip Series CD746A – CD759A, CD4370A – CD4372A

	Nominal Zener Voltage, $V_Z @ I_{ZT}$ (Note 1)	Zener Test Current, $I_{ZT}$	Maximum Zener Impedance, $Z_{ZT} @ I_{ZT}$ (Note 2)	Maximum Reverse Leakage Current $I_R @ V_R$	Maximum Zener Current, $I_{ZM}$
Types	Volts	mA	Ohms	$\mu$ A	mA
CD4370A	2.4	20	30	100	155
CD4371A	2.7	20	30	75	140
CD4372A	3.0	20	29	50	125
CD746A	3.3	20	28	10	120
CD747A	3.6	20	24	5	110
CD748A	3.9	20	23	5	100
CD749A	4.3	20	22	2	90
CD750A	4.7	20	19	5	85
CD751A	5.1	20	17	5	75
CD752A	5.6	20	11	5	70
CD753A	6.2	20	7	5	85
CD754A	6.8	20	5	2	60
CD755A	7.5	20	6	2	55
CD756A	8.2	20	8	1	50
CD757A	9.1	20	10	1	45
CD758A	10.0	20	17	1	40
CD759A	12.0	20	30	1	35

Electrical specifications @ +25°C (unless otherwise specified). **AVAILABLE IN JANHC AND JANKC PER MIL-PRF-19500/127.**

NOTE 1: Zener voltage range equals nominal voltage  $\pm$  5% for "A" Suffix. No Suffix denotes  $\pm$  10%. "C" suffix =  $\pm$  2% and "D" suffix =  $\pm$  1%. Zener voltage is read using a pulse measurement, 10 milliseconds maximum.

NOTE 2: Zener impedance is derived by superimposing on  $I_{ZT}$  a 60 Hz rms a.c. current equal to 10 % of  $I_{ZT}$ .

## Silicon Switching Diode Chips CD914, CD4148, CD4531, CD6642 & CD4454

	$V_{BR} @ 100 \text{ mA}$	$V_{RWM}$	$I_O$	$V_{F1} @ I_F = 10 \text{ mA}$	$V_{F2} @ I_F = 50 \text{ mA}$	$V_{F3} @ I_F = 100 \text{ mA}$	$t_{rr}$	$I_{R1} @ 20 \text{ Vdc}$	$I_{R2}$	$I_{R3} @ 20 \text{ Vdc}$ $T_A = 150^\circ\text{C}$	$I_{R4} @ 150^\circ\text{C}$	Capacitance @ 0V	Capacitance @ 1.5V
Types	Volts (min)	Volts (pk)	mA	Vdc	Vdc	Vdc	nsec	nA	$\mu\text{A} @ \text{V}$	$\mu\text{A}$	$\mu\text{A} @ \text{V}$	pF	pF
CD914	100	75	75	0.8	1.2	N/A	5	25	0.5 @ 75	35	75 @ 75	4.0	2.8
CD4148	100	75	200	0.8	N/A	1.2	5	35	0.5 @ 75	35	75 @ 75	4.0	2.8
CD4531													
CD6642													
CD4454	75	50	200	1.0	N/A	N/A	4	N/A	0.1 @ 50	N/A	100 @ 50	2.0	N/A

Electrical specifications @ +25°C (unless otherwise specified).

**CD914, CD4148, CD4531, AVAILABLE IN JANHC AND JANKC PER MIL-PRF-19500/116. CD6642 AVAILABLE IN JANHC AND JANKC PER MIL-PRF-19500/1578.**

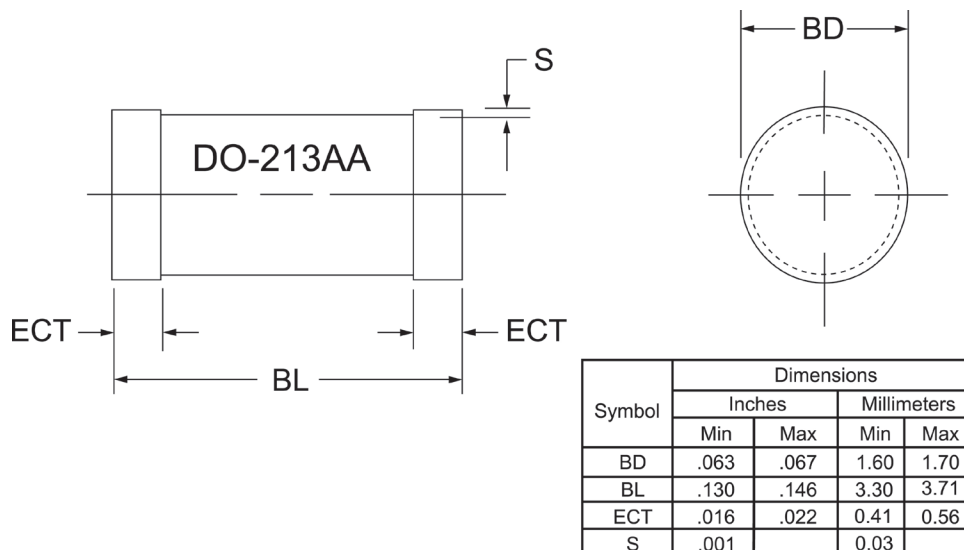
## Silicon Switching Diode Chips CD3600, CD4150, CD6640 & CD4153

	$V_{BR} @ I_R = 10 \mu\text{A}^*$	$V_{RWM}$	$I_{R1} @ V_R = 50 \text{ Vdc}$ $T_A = 150^\circ\text{C}$	$I_{R2} @ V_R = 50 \text{ Vdc}$ $T_A = 150^\circ\text{C}$	Capacitance $V_R = 0, f = 1 \text{ MHz}$ ac signals = 50 mV (p-p)	$t_{rr}$
Types	Volts (min)	Volts (pk)	$\mu\text{A} @ \text{Vdc}$	$\mu\text{A} @ \text{Vdc}$	pF	nsec
CD3600	75	50	0.10	100	2.5	4
CD4150	75	50	0.10	100	2.5	4
CD6640						
CD4153	75*	50	0.05	150	2.0	4

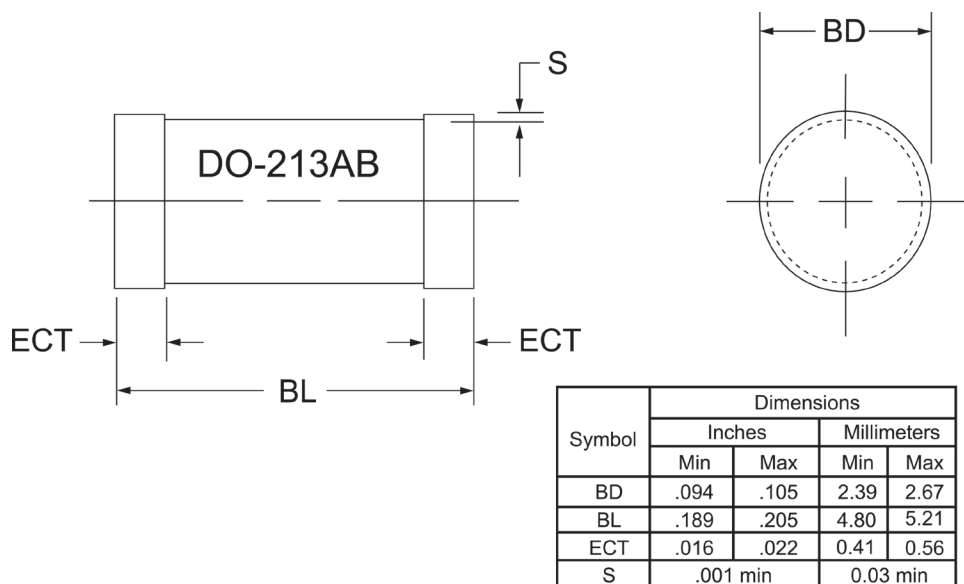
\* @ 5 mA for CD4153

Electrical specifications @ +25°C (unless otherwise specified). **CD6640 AVAILABLE IN JANHC AND JANKC PER MIL-PRF-19500/609.**

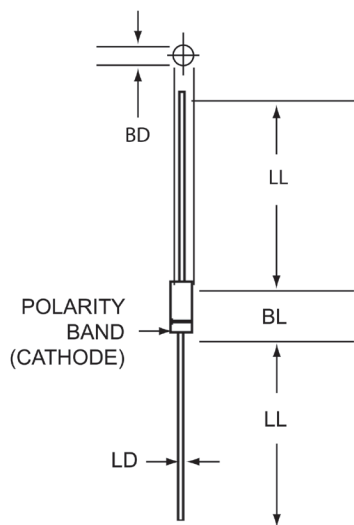
## DO-213AA



## DO-213AB



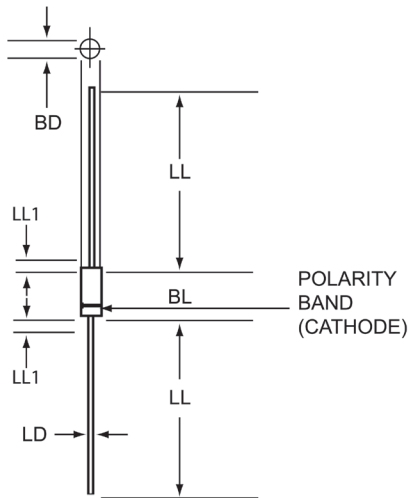
## DO-34, DO-35



Type	LTR	Dimensions			
		Inches		Millimeters	
		MIN	MAX	MIN	MAX
1N4148-1 14914	BD	.056	.075	1.42	1.91
	BL	.140	.180	3.56	4.57
	LD	.018	.022	0.46	0.56
(DO-35)	LL	1.000	1.500	25.40	38.10
1N41531	BD	.050	.075	1.27	1.90
	BL	.080	.120	2.03	3.05
	(DO-34)	LD	.018	.022	0.46
(DO-34)	LL	1.000	1.500	25.40	38.10

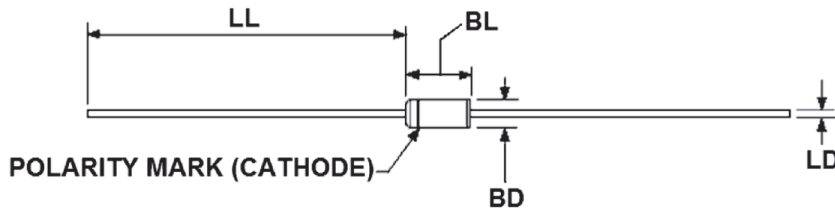
# Diode Packaging

## DO-7



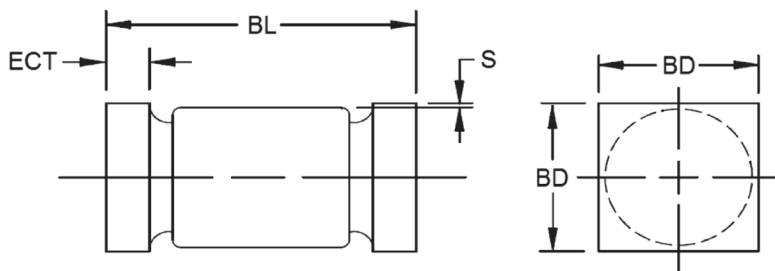
Symbol	Dimensions			
	Inches		Millimeters	
	MIN	MAX	MIN	MAX
BD	.060	.107	1.52	2.72
BL	.120	.300	3.05	7.62
LD	.018	.022	0.46	0.58
LL	1.000	1.500	25.40	38.10
LL1		0.050		1.27

## DO-5D



Symbol	Dimensions			
	Inches		Millimeters	
	MIN	MAX	MIN	MAX
BD	.059	.080	1.42	2.03
BL	.130	.180	3.30	4.57
LD	.018	.022	0.46	0.56
LL	1.00	1.50	25.40	38.10

## DO-5DUS



Symbol	Dimensions			
	Inches		Millimeters	
	MIN	MAX	MIN	MAX
BD	.070	.085	1.78	2.16
BL	.165	.195	4.19	4.95
ECT	.019	.028	0.48	0.71
S	0.003		0.08	

# Transistors for Hi-Rel Applications

NPN Transistors	Slash Sheet	$V_{CE0}(Bus)$	$V_{CB0}$	$I_C(max)$	$I_{FE} @ I_C/V_{CE}$	$C_{Obs}$	$f_T$	Package
		Volts	Volts	Amps	min/max@AVV	pF	MHz	
NPN Transistors		Volts	Volts	Amps	min/max@AVV	pF	MHz	
2N1479	207	40	60	1.5	20/60@2/4	-	-	TO-5/TO-39
2N1480	207	55	100	1.5	20/60@2/4	-	-	TO-5/TO-39
2N1481	207	40	60	1.5	35/100@2/4	-	-	TO-5/TO-39
2N1482	207	55	100	1.5	35/100@2/4	-	-	TO-5/TO-39
2N1483	180	40	60	3	20/60@74/4	400	-	TO-8
2N1484	180	55	100	3	20/60@74/4	400	-	TO-8
2N1485	180	40	60	3	35/100@75/4	400	-	TO-8
2N1486	180	55	100	3	35/100@75/4	400	-	TO-8
2N1711	225	30	75	0.5	100/300 @ .15/10	25	70/240	TO-5/TO-39
2N1890	225	60	100	0.5	100/300 @ .15/10	15	70/240	TO-5/TO-39
2N2369A*†	317	15	40	-	30/120@3/4	4	50/1000	TO-18/UA/UB/U
2N3055	407	70	100	15	20/60 @ 4/4	700	800/4000	TO-3
2N3227*†	317	20	40	-	30/120@3/4	4	50/1000	TO-18/UA/UB
2N3418*†	393	60	85	3	20/60 @ 1/2	150	26/160	TO-5/TO-39
2N3419*†	393	80	125	3	20/60 @ 1/2	150	26/160	TO-5/TO-39
2N3420*†	393	60	85	3	40/120 @ 1/2	150	26/160	TO-5/TO-39
2N3421*†	393	80	125	3	40/120 @ 1/2	150	26/160	TO-5/TO-39
2N3439*†	368	350	450	1	40/160@2/10	10	15/75	TO-5/TO-39/UA/UB
2N3440*†	368	250	300	1	40/160@2/10	10	15/75	TO-5/TO-39/UA/UB
2N3441	369	140	160	3	25/100@5/4	300	400/4000	TO-66
2N3442	370	140	160	10	20/70@3/4	-	100/-	TO-3
2N3584	384	250	375	2	3/15@2/10	120	15/75	TO-66
2N3585	384	300	500	2	3/15@2/10	120	15/75	TO-66
2N3715*	408	60	80	10	30/120 @ 3/2	500	4/20	TO-3
2N3716*	408	80	100	10	30/120 @ 3/2	500	4/20	TO-3
2N3766	518	60	80	4	40/160 @ 5/5	50	10/80	TO-66
2N3767	518	80	100	4	40/160 @ 5/5	50	10/80	TO-66
2N3771	413	40	50	30	6/30@1/4	1200	600/3000	TO-3
2N3772	413	60	100	20	6/30@1/4	1200	600/3000	TO-3
2N3879	526	75	120	7	20/80@4/5	170	40/200	TO-66
2N3902	371	400	700	3.5	30/90 @ 1/5	250	2.5/25	TO-3
2N4150*†	394	70	100	10	40/120 @ 5/5	350	15/75	TO-5/TO-39
2N4237	581	40	50	1	30/150 @ .25/1	100	30	TO-39
2N4238	581	60	80	1	30/150 @ .25/1	100	30	TO-39
2N4239	581	80	100	1	30/150 @ .25/1	100	30	TO-39
2N4449*†	317	15	40	-	30/120@3/4	4	50/1000	TO-46/UA/UB
2N5038*	439	90	150	20	50/200@2/5	500	60/240	TO-3
2N5039*	439	75	125	20	30/150@2/5	500	60/240	TO-3
2N5152*†	544	80	100	2	30/90 @ 2.5/5	250	60	TO-5/TO-39/UB
2N5154*†	544	80	100	2	70/200 @ 2.5/5	250	70	TO-5/TO-39/UB
2N5157	371	500	700	3.5	30/90 @ 1/5	250	2.5/25	TO-3
2N5302*	456	60	60	30	15/60@1/5/2	800	2/40	TO-3
2N5303*	456	80	80	20	15/60@10/2	800	2/40	TO-3
2N5339*†	560	100	100	5	60/240 @ 2/2	250	30/150	TO-39
2N5664*†	455	250	200	250	40/120@1/5	120	20/70	TO-66
2N5665*†	455	400	300	400	25/75@1/5	120	20/70	TO-66
2N5666*	455	250	200	250	40/120@1/5	120	20/70	TO-5/TO-39/UB
2N5667*	455	400	300	400	25/75@1/5	120	20/70	TO-5/TO-39
2N5671*	488	90	120	30	20/100@15/2	900	50/200	TO-3
2N5672*	488	120	150	30	20/100@15/2	900	50/200	TO-3
2N5681	583	100	100	1	40/150@25/2	50	30/-	TO-39

AVAILABLE IN JAN, JANTX AND JANTXV PER APPLICABLE SLASH SHEET.

\* ALSO AVAILABLE IN JANS.

† ALSO QUALIFIED TO JANSR.

# Transistors for Hi-Rel Applications

## NPN Transistors (Continued)

	Slash Sheet	$V_{CE0}(typ)$	$V_{CB0}$	$I_{C(max)}$	$h_{FE} @ I_C / V_{CE}$	$C_{obo}$	$f_t$	Package
NPN Transistors		Volts	Volts	Amps	min/max@AV	pF	MHz	
2N5682	583	120	120	1	40/150@.25/2	50	30/-	TO-39
2N5685	464	60	60	50	15/60@25/2	1200	2/20	TO-3
2N5686	464	80	80	50	15/60@25/2	1200	2/20	TO-3
2N6032	528	90	120	50	10/50@50/2.6	1000	50/200	TO-3
2N6033	528	120	150	40	10/50@40/2	1000	50/200	TO-3
2N6249*	510	200	300	10	10/50 @ 10/3	500	2.5/15	TO-3
2N6250*	510	275	375	10	8/50 @ 10/3	500	2.5/15	TO-3
2N6251*	510	350	450	10	6/50 @ 10/3	500	2.5/15	TO-3
2N6274	514	100	120	50	30/120@20/4	600	30/120	TO-3
2N6277	514	150	180	50	30/120@20/4	600	30/120	TO-3
2N6338*	509	100	120	25	30/120@10/2	450	40/120	TO-3
2N6341*	509	150	180	25	30/120@10/2	450	40/120	TO-3
2N6674	537	300	450	15	8/20 @ 10/2	500	15	TO-3
2N6675	537	400	650	15	8/20 @ 10/2	500	15	TO-3
2N6676*†	538	300	450	15	8/20 @ 15/3	500	15	TO-3
2N6678*†	538	400	650	15	8/20 @ 15/3	500	15	TO-3

AVAILABLE IN JAN, JANTX AND JANTXV PER APPLICABLE SLASH SHEET.

\* ALSO AVAILABLE IN JANS.

† ALSO QUALIFIED TO JANSR.



## PNP Transistors

	Slash Sheet	$V_{CE0}(typ)$	$V_{CB0}$	$I_{C(max)}$	$h_{FE} @ I_C / V_{CE}$	$C_{obo}$	$f_t$	Package
PNP Transistors		Volts	Volts	Amps	min/max@AV	pF	MHz	
2N3634*†	357	140	140	1	50/150@.005/10	10	150/800	TO-5/TO-39/UB/UBN
2N3635*†	357	140	140	1	100/300@.005/10	10	200/850	TO-5/TO-39/UB/UBN
2N3636*†	357	175	175	1	50/150@.005/10	10	150/800	TO-5/TO-39/UB/UBN
2N3637*†	357	175	175	1	100/300@.005/10	10	200/850	TO-5/TO-39/UB/UBN
2N3740*†	441	60	60	4	30/120 @ .25/1	100	5/60	TO-66
2N3741*†	441	80	80	4	30/120 @ .25/1	100	5/60	TO-66
2N3791*	379	60	60	10	30/120 @ 3/2	500	4/20	TO-3
2N3792*	379	80	80	10	30/120 @ 3/2	500	4/20	TO-3
2N3867*†	350	40	40	3	40/200 @ 1.5/2	120	60/240	TO-5/TO-39
2N3868*†	350	60	60	3	30/150 @ 1.5/2	120	60/240	TO-5/TO-39
2N4029*†	512	80	80	1	100/300@ 1/5	20	150/600	TO-18/UA/UB
2N4033*†	512	80	80	1	100/300@ 1/5	20	150/600	TO-39/UA/UB
2N4234	580	40	40	1	30/150 @ .25/1	100	30/100	TO-39
2N4235	580	60	60	1	30/150 @ .25/1	100	30/100	TO-39
2N4236	580	80	80	1	30/150 @ .25/1	100	30/100	TO-39
2N4399	433	-60	-60	-30	15/60 @ -15/-2	1000	4/40	TO-3
2N4405	448	-80	-80	-.05	100/300 @ .15/-5	20	200/600	TO-39/UA/UB
2N5151*†	545	80	100	2	30/90 @ 2.5/5	250	60/-	TO-5/TO-39/U3
2N5153*†	545	80	100	2	70/200 @ 2.5/5	250	70/-	TO-5/TO-39/U3
2N5415*	485	-200	-200	-1	30/120 @ -50/-10	15	15/75	TO-5/UA/UB
2N5416*	485	-300	-350	-1	30/120 @ -50/-10	15	15/75	TO-5/UA/UB
2N5679	582	100	100	1	40/50@.25/2	50	30/-	TO-39
2N5680	582	120	120	1	40/50@.25/2	50	30/-	TO-39
2N5683	466	60	60	50	15/60@25/2	2000	2/20	TO-3
2N5684	466	80	80	50	15/60@25/2	2000	2/20	TO-3
2N5745	433	-80	-80	-20	15/60 @ -10/-2	1000	4/40	TO-3
2N6193*†	561	100	100	5	60/240 @ 2/2	300	30/150	TO-39/U3

AVAILABLE IN JAN, JANTX, AND JANTXV.

\* ALSO AVAILABLE IN JANS.

† ALSO QUALIFIED TO JANSR.

# Transistors for Hi-Rel Applications

## NPN Small Signal Transistors

	Slash Sheet	$V_{CE(sus)}$	$V_{CBO}$	$I_{C(max)}$	$h_{FE} @ I_C / V_{CE}$	$C_{obo}$	$f_T$	Package
NPN Small Signal Transistors		Volts	Volts	Amps	min/max@AV	pF	MHz	
2N718A	181	30	75	0.5	40/120 @ .15/10	25	60/-	TO-18
2N1613	181	30	75	0.5	40/120 @ .15/10	25	60/-	TO-5
2N1613L	181	30	75	0.5	40/120 @ .15/10	25	60/-	TO-39
2N2218*†	251	30	60	0.8	25/150@.001/10	8	250/1200	TO-5/TO-39
2N2218A*†	251	50	75	0.8	35/150@.001/10	8	250/1200	TO-5/TO-39
2N2219*†	251	30	60	0.8	50/325@.001/10	8	250/1200	TO-5/TO-39
2N2219A*†	251	50	75	0.8	75/325@.001/10	8	250/1200	TO-5/TO-39
2N2221A*†	255	50	75	0.8	40/120 @ .15/10	8	250/-	TO-18/UA/UB
2N2222A*†	255	50	75	0.8	100/300 @ .15/10	8	250/-	TO-18/UA/UB
2N2484*†	376	60	60	0.05	250/800@.001/5	5	60/210	TO-18/UA/UB
2N3019*†	391	80	140	1	50/300@.1/10	12	100/400	TO-5/TO-39
2N3057A*†	391	80	140	1	50/300@.1/10	12	100/400	TO-46
2N3498*	366	100	100	0.5	40/120 @ .15/10	10	150/800	TO-5/TO-39/U4
2N3499*	366	100	100	0.5	100/300 @ .15/10	10	150/800	TO-5/TO-39/U4
2N3500*†	366	150	150	0.3	40/120@.15/10	8	150/800	TO-5/TO-39/U4
2N3501*†	366	150	150	0.3	100/300@.15/10	8	150/800	TO-5/TO-39/UB/U4
2N5581	423	50	75	0.8	40/120 @ .15/10	8	250/500	TO-46
2N5582	423	50	75	0.8	100/300 @ .15/10	80	250/500	TO-46
2N3700*†	391	80	140	1	100/300 @ .15/10	12	100/400	TO-18/UA/UB
2N6989*†	559	50	75	0.8	75/325@.1/10	8	250/1000	TO-116/U/14LFP/20PLC
2N6990*†	559	50	75	0.8	75/325@.1/10	8	250/1000	TO-116/U/14LFP/20PLC

AVAILABLE IN JAN, JANTX AND JANTXV PER APPLICABLE SLASH SHEET.

\* ALSO AVAILABLE IN JANS.

† ALSO QUALIFIED TO JANSR.



## PNP Small Signal Transistors

	Slash Sheet	$V_{CE(sus)}$	$V_{CBO}$	$I_{C(max)}$	$h_{FE} @ I_C / V_{CE}$	$C_{obo}$	$f_T$	Package
PNP Small Signal Transistors		Volts	Volts	Amps	min/max@AV	pF	MHz	
2N2904*†	290	40	60	0.6	40/120@.15/10	8	200/-	TO-5/TO-39
2N2905A*†	290	60	60	0.6	100/300 @ .15/10	8	200/-	TO-5/TO-39
2N2906A*†	291	60	60	0.6	100/300 @ .15/10	8	200/-	TO-18/UA/UB
2N2907A*†	291	60	60	0.6	100/300 @ .15/10	8	200/-	TO-18/UA/UB
2N3485A	392	-60	-60	-0.6	40/120 @ .15/10	8	2/10	TO-46
2N3486A	392	-80	-80	-0.6	100/300 @ .15/10	8	2/10	TO-46
2N6987*†	558	60	60	0.6	100/450@.1/10	8	200/800	TO-116/U/14LFP/20PLC
2N6988*†	558	60	60	0.6	100/450@.1/10	8	200/800	TO-116/U/14LFP/20PLC

AVAILABLE IN JAN, JANTX AND JANTXV PER APPLICABLE SLASH SHEET.

\* ALSO AVAILABLE IN JANS.

† ALSO QUALIFIED TO JANSR.

# Transistors for Hi-Rel Applications

## Darlington Transistors

	Slash Sheet	$V_{CE(sus)}$	$V_{CBO}$	$I_{C(max)}$	$h_{FE} @ I_C/V_{CE}$	$C_{obp}$	$f_T$	Package
Darlington Transistors		Volts	Volts	Amps	min/max@AV	pF	MHz	
2N6051	501	80	80	12	1K/18K @ 6/3	300	10/250	TO-3
2N6052	501	100	100	12	1K/18K @ 6/3	300	10/250	TO-3
2N6058	502	80	80	12	1K/18K @ 6/3	300	10/250	TO-3
2N6059	502	100	100	12	1K/18K @ 6/3	300	10/250	TO-3
2N6283	504	80	80	20	1.25K/18K @ 10/3	350	8	TO-3
2N6284	504	100	100	20	1.25K/18K @ 10/3	350	8	TO-3
2N6286	505	-80	-80	-20	1.25K/18K @ -10/-3	400	8/80	TO-3
2N6287	505	-100	-100	-20	1.25K/18K @ -10/-3	400	8/80	TO-3
2N6298	540	-60	-60	-8	750/18K @ -4/-3	200	25/350	TO-66
2N6299	540	-80	-80	-8	750/18K @ -4/-3	200	25/350	TO-66
2N6300	539	60	60	8	750/18K @ 4/3	200	25	TO-66
2N6301	539	80	80	8	750/18K @ 4/3	200	25	TO-66
2N6383	523	40	40	10	1K/20K @ 5/3	200	20/300	TO-3
2N6384	523	60	60	10	1K/20K @ 5/3	200	20/300	TO-3
2N6385	523	80	80	10	1K/20K @ 5/3	200	20/300	TO-3
2N6648	527	-40	-40	-10	1K/20K @ -5/-3	300	30/400	TO-3
2N6649	527	-60	-60	-10	1K/20K @ -5/-3	300	30/400	TO-3
2N6650	527	-80	-80	-10	1K/20K @ -5/-3	300	30/400	TO-3

ALL PARTS ARE QUALIFIED TO MIL-PRF-19500 SLASH SHEETS AS NOTED. AVAILABLE IN JAN, JANTX AND JANTXV.



## Silicon Controlled Rectifiers

	Slash Sheet	$V_{DRM}$	$I_o$	$I_{HBM}$	$V_{GT}$	$I_{GT}$	$I_{HOX}$	Package
Silicon Controlled Rectifiers		Volts	mA	$\mu A$	Volts min/max	$\mu A$	mA	
2N2323	276	50	220	10	0.35/0.80	200	2	TO-5
2N2323S	276	50	220	10	0.35/0.80	200	2	TO-39
2N2323A	276	50	220	10	0.35/0.60	20	2	TO-5
2N2323AS	276	50	220	10	0.35/0.60	20	2	TO-39
2N2324	276	100	220	10	0.35/0.80	200	2	TO-5
2N2324S	276	100	220	10	0.35/0.80	200	2	TO-39
2N2324A	276	100	220	10	0.35/0.60	20	2	TO-5
2N2324AS	276	100	220	10	0.35/0.60	20	2	TO-39
2N2326	276	200	220	10	0.35/0.80	200	2	TO-5
2N2326S	276	200	220	10	0.35/0.80	200	2	TO-39
2N2326A	276	200	220	10	0.35/0.60	20	2	TO-5
2N2326AS	276	200	220	10	0.35/0.60	20	2	TO-39
2N2328	276	300	220	10	0.35/0.80	200	2	TO-5
2N2328S	276	300	220	10	0.35/0.80	200	2	TO-39
2N2328A	276	300	220	10	0.35/0.60	20	2	TO-5
2N2328AS	276	300	220	10	0.35/0.60	20	2	TO-39
2N2329	276	400	220	10	0.35/0.80	200	2	TO-5
2N2329S	276	400	220	10	0.35/0.80	200	2	TO-39
2N2329A	276	400	220	10	0.35/0.60	20	2	TO-5
2N2329AS	276	400	220	10	0.35/0.60	20	2	TO-39

ALL PARTS ARE QUALIFIED TO MIL-PRF-19500/276. AVAILABLE IN JAN, JANTX AND JANTXV.

## Dual NPN/PNP Transistors

	Slash Sheet	$V_{CE(sus)}$	$V_{CBO}$	$I_{C(max)}$	$h_{FE} @ I_C/V_{CE}$	$C_{obp}$	$f_T$	Package
Dual NPN/PNP Transistors		Volts	Volts	Amps	min/max@AV	pF	MHz	
2N4854	421	40	60	0.6	100/300 @ .15/10	8	200/1000	TO-78/U

# Transistors for Hi-Rel Applications

## Dual PNP Small Signal Transistors

	Slash Sheet	$V_{CE0(sus)}$	$V_{CB0}$	$I_{C(max)}$	$h_{FE} @ I_C / V_{CE}$	$C_{ob0}$	$f_T$	Package
Dual PNP Small Signal Transistors		Volts	Volts	Amps	min/max@AV	pF	MHz	
2N5795*†	496	60	60	0.6	2/10@2/20	8	200/1000	TO-78
2N5796*†	496	60	60	0.6	2/10@2/20	8	200/1000	TO-78/U

AVAILABLE IN JAN, JANTX AND JANTXV PER APPLICABLE SLASH SHEET.

\* ALSO AVAILABLE IN JANS.

† ALSO QUALIFIED TO JANSR.

## Dual NPN Small Signal Transistors

	Slash Sheet	$V_{CE0(sus)}$	$V_{CB0}$	$I_{C(max)}$	$h_{FE} @ I_C / V_{CE}$	$C_{ob0}$	$f_T$	Package
Dual NPN Small Signal Transistors		Volts	Volts	Amps	min/max@AV	pF	MHz	
2N2919*†	355	60	70	30	60/240@10/5	5	60/400	TO-78/U
2N2920*†	355	60	70	39	175/600@10/5	5	60/400	TO-78/U
2N5793*	495	40	75	0.6	40/120@.15/10	8	200/1000	TO-99
2N5794*	495	40	75	0.6	100/300@.15/10	8	200/1000	TO-99/U

\* ALSO AVAILABLE IN JANS.

† ALSO QUALIFIED TO JANSR.

## Chip Transistors

	Slash Sheet	$V_{CE0(sus)}$	$V_{CB0}$	$I_{C(max)}$	$h_{FE} @ I_C / V_{CE}$	$C_{ob0}$	$f_T$	Package
Chip Transistors		Volts	Volts	Amps	min/max@AV	pF	MHz	
2N2218	251	30	60	0.8	25/150@001/10	8	250/1200	Chip
2N2219	251	30	60	0.8	50/325@001/10	8	250/1200	Chip
2N2221A	255	50	75	0.8	40/120@.15/10	8	250/-	Chip
2N2222A	255	50	75	0.8	100/300@.15/10	8	250/-	Chip
2N2484	376	60	60	0.05	250/800@001/5	5	60/210	Chip
2N2906A	291	60	60	0.6	100/300@.15/10	8	200/-	Chip
2N2907A	291	60	60	0.6	100/300@.15/10	8	200/-	Chip
2N2919	355	60	70	30	60/240@10/5	5	60/400	Chip
2N2920	355	60	70	30	175/600@10/5	5	60/400	Chip
2N3019	391	80	140	1	50/300@1/10	12	100/400	Chip
2N3057	391	80	140	1	50/300@1/10	12	100/400	Chip
2N3498	366	100	100	0.5	40/120@.15/10	10	150/800	Chip
2N3499	366	100	100	0.5	100/300@.15/10	10	150/800	Chip
2N3500	366	150	150	0.3	40/120@.15/10	8	150/800	Chip
2N3501	366	150	150	0.3	50/150@.005/10	10	150/800	Chip
2N3634	357	140	140	1	100/300@.005/10	10	150/800	Chip
2N3635	357	140	140	1	50/150@.005/10	10	200/850	Chip
2N3636	357	175	175	1	100/300@.005/10	10	150/800	Chip
2N3637	357	175	175	1	100/300@.15/10	8	200/850	Chip
2N3700	391	80	140	1	100/300@.15/10	12	100/400	Chip
2N3867	350	40	40	3	40/200@1.5/2	120	60/240	Chip
2N3868	350	60	60	3	30/150@1.5/2	120	60/240	Chip
2N4029	512	-80	-80	-1	100/300@-.1/-.5	20	150/160	Chip
2N4033	512	-80	-80	-1	100/300@-.1/-.5	20	150/160	Chip
2N4150	394	70	100	10	40/120@5/5	350	15/75	Chip
2N5151	545	80	100	2	30/90@2.5/5	250	60/-	Chip
2N5152	544	80	100	2	30/90@2.5/5	250	60	Chip
2N5153	545	80	100	2	70/200@2.5/5	250	70/-	Chip
2N5154	544	80	100	2	70/200@2.5/5	250	70	Chip
2N5339	560	100	100	5	60/240@2/2	250	30/150	Chip
2N5681	583	100	100	1	40/150@25/12	50	30/-	Chip
2N5682	583	120	120	1	40/150@25/12	50	30/-	Chip
2N6193	561	100	100	5	60/240@2/2	300	30/150	Chip

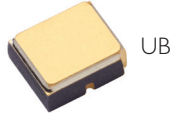
AVAILABLE IN JANHC AND JANKC PER THE APPLICABLE SLASH SHEET.

# Transistors for Hi-Rel Applications

## JFET N Channel

	Slash Sheet	$V_{GS}$	$V_{DS(on)}$	$V_{GS(off)}$	$I_{SS(max)}$	$r_{ds(on)}$	$I_{GSS}$	$C_{iss}$	$C_{rss}$	Package
JFET N Channel		Volts	Volts	Volts	mA	$\Omega$	nA	pF	pF	
2N4856*	385	-40	0.75	-4 / -10	50/175	25	-0.25	18	8	TO-18/UB
2N4857*	385	-40	0.50	-2 / -6	20/100	40	-0.25	18	8	TO-18/UB
2N4858*	385	-40	0.50	-0.8 / -4	8/80	60	-0.25	18	8	TO-18/UB
2N4859*	385	-30	0.75	-4 / -10	50/175	25	-0.25	18	8	TO-18/UB
2N4860*	385	-30	0.50	-2 / -6	20/100	40	-0.25	18	8	TO-18/UB
2N4861*	385	-30	0.50	-0.8 / -4	8/80	60	-0.25	18	8	TO-18/UB

\* AVAILABLE IN JANS



## JFET P Channel

	Slash Sheet	$V_{GS}$	$V_{DS(on)}$	$V_{GS(off)}$	$I_{SS(max)}$	$r_{ds(on)}$	$I_{GSS}$	$C_{iss}$	$C_{rss}$	Package
JFET P Channel		Volts	Volts	Volts	mA	$\Omega$	pA	pF	pF	
2N5114	476	30	-1.3	5.0 / 10	-30 / -90	75	500	25	7.0	TO-18/UB
2N5115	476	30	-0.8	3.0 / 6.0	-15 / -60	100	500	25	7.0	TO-18/UB
2N5116	476	30	-0.6	1.0 / 4.0	-5.0 / -25	175	500	27	7.0	TO-18/UB

## N Channel MOSFETS

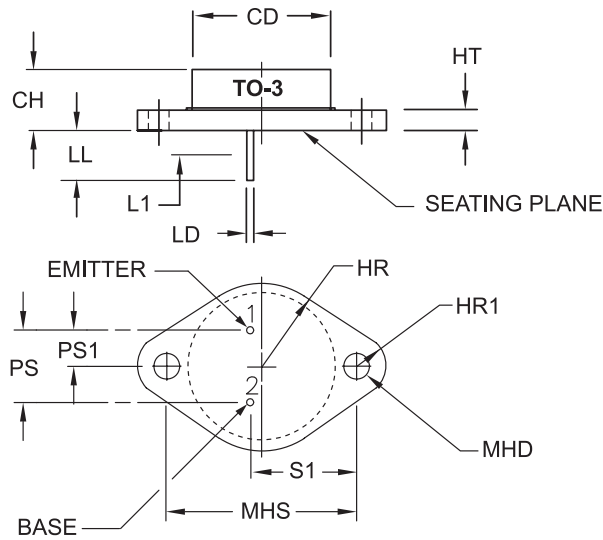
	Slash Sheet	$V_{DS}$	$V_{DGR}$	$V_{GS}$	$I_{D1}$	$I_{S}$	$I_{DM}$	$V_{GS(th)}$	$r_{ds(on)}$	Package
N Channel MOSFETS		Volts	Volts	Volts	Amps	Amps	Amps (pk)	min/max@VDS/ID	$\Omega$	
2N6660*	547	60	60	$\pm 20$	0.99	-0.99	3	0.8/2.0	3.0	TO-39/UB
2N6661*	547	90	90	$\pm 20$	0.86	-0.86	3	0.8/2.0	4.0	TO-39/UB

\* AVAILABLE IN JANS

## Dual N Channel JFETS

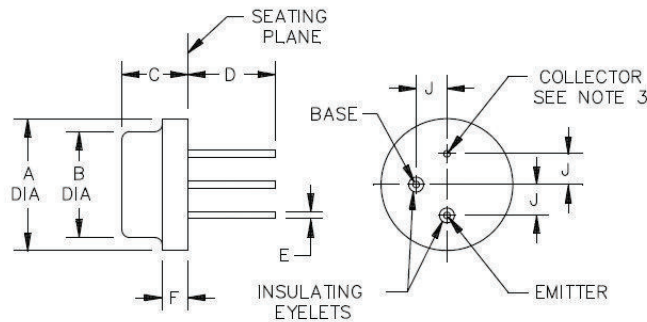
	Slash Sheet	$V_{DG}$	$V_{GS}$	$I_G$	$I_{SS(min/max)}$	$V_{GS(off)}$	$C_{iss}$	$C_{rss}$	$IDSS1/IDSS2$	Package
Dual N Channel JFETS		Volts	Volts	mA	mA	min/max@VDS/ID	pF	pF	$V_{DG} = 15V, V_{GS} = 0$	
2N5545	430	50	-50	30	0.5/0.8	-0.5/-4.5@15/0.5	6.0	2.0	0.95/1.05	TO-71
2N5546	430	50	-50	30	0.5/0.8	-0.5/-4.5@15/0.5	6.0	2.0	0.9/1.10	TO-71
2N5547	430	50	-50	30	0.5/0.8	-0.5/-4.5@15/0.5	6.0	2.0	0.9/1.10	TO-71

## TO-3



LTR	Dimensions			
	Inches		Millimeters	
	MIN	MAX	MIN	MAX
CD		.875		22.23
CH	.250	.450	6.35	11.43
HR	.495	.525	12.57	13.34
HR1	.131	.188	3.33	4.78
HT	.050	.135	1.27	3.43
LD	.038	.053	0.97	1.35
LL	.312	.500	7.92	12.70
L1		.050		1.27
MHO	.151	.161	3.84	4.09
MHS	1.177	1.197	29.90	30.40
PS	.420	.440	10.67	11.18
PS1	.205	.25	5.21	6.35
S1	.665	.675	16.89	17.15

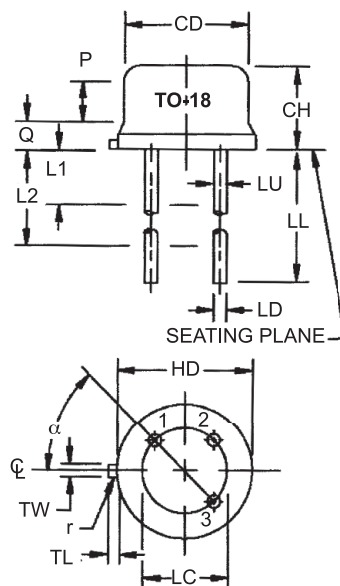
## TO-8



LTR	Dimensions				Notes	LTR	Dimensions				Notes
	Inches		Millimeters				Inches		Millimeters		
	Min	Max	Min	Max			Min	Max	Min	Max	
A	.550	.650	13.97	16.51		E	.027	.033	0.69	0.84	3, 4
B	.444	.524	11.28	13.31		F		.115		2.92	
C	.270	.330	6.86	8.38		J	.136	.146	3.45	3.71	
D	.360	.440	9.14	11.18	3						

- NOTES:
1. Dimensions are in inches. Millimeters are given for general information only.
  2. The collector shall be internally connected to the case.
  3. All three leads.
  4. Measured in the zone beyond .050 (1.27 mm) from the seating plane.

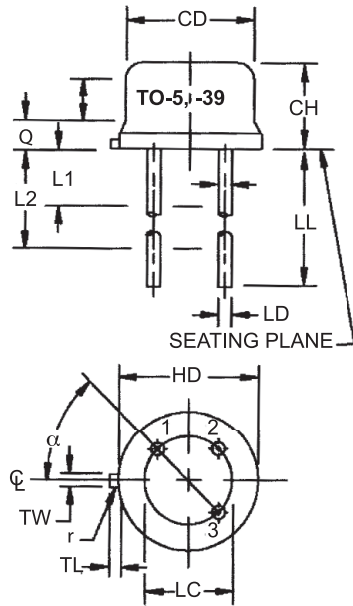
## TO-18



LTR	Dimensions			
	Inches		Millimeters	
	MIN	MAX	MIN	MAX
CD	.178	.195	4.52	4.95
CH	.170	.210	4.32	5.33
HD	.209	.230	5.31	5.84
LC	.100 TP		2.54 TP	
LD	.016	.019	.041	.048
LL	.500	.750	12.70	19.05
LU	.016	.019	.041	.048
L1		.050		1.27
L2	.250		6.35	
P	.100		2.54	
Q		.030		0.76
TL	.028	.048	0.71	1.22
TW	.036	.046	0.91	1.17
r		.010		0.25
alpha	45° TP		45° TP	
	1, 2, 9, 11, 13			

# Transistor Packaging

## TO-5, TO-39

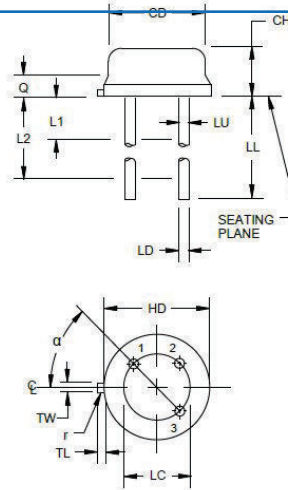


LTR	Dimensions			
	Inches		Millimeters	
	MIN	MAX	MIN	MAX
CD	.305	.335	7.75	8.51
CH	.240	.260	6.10	6.60
HD	.335	.370	8.51	9.40
LC	.200 TP		5.08 TP	
LD	.016	.019	.041	.048
LL	.500	.750	12.7	19.05
LU	.016	.019	.041	.048
L1		.050		1.27
L2	.250		6.35	
P	.100		2.54	
Q		.030		0.76
TL	.029	.045	0.74	1.14
TW	.028	.034	0.71	0.86
r		.010		0.25
$\alpha$	45° TP		45° TP	
	1, 2, 10, 12, 13, 14			

TO-5 LL dimension shall be 1.5 inches max (38.1 mm) minimum and 1.75 inches (44.4 mm) maximum

## TO-46

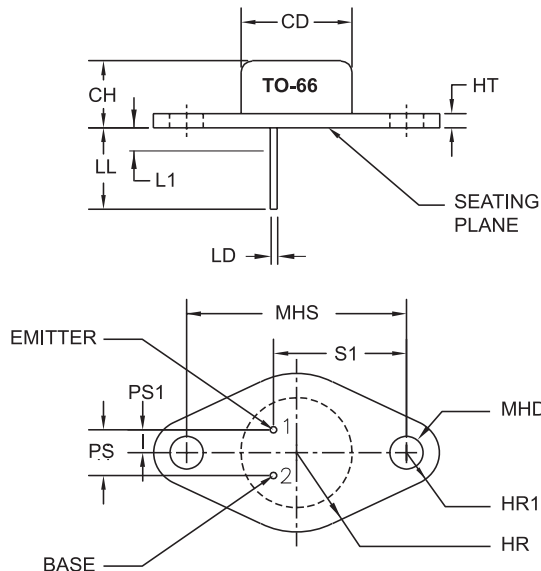
Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	.178	.195	4.52	4.95	
CH	.065	.085	1.65	2.16	
HD	.209	.230	5.31	5.84	
LC	.100 TP		2.54 TP		4
LD	.016	.021	0.41	0.53	5
LL	.500	1.750	12.70	44.45	5, 6
LU	.016	.019	0.41	0.48	5, 6
L1		.050		1.27	5, 6
L2	.250		6.35		5, 6
Q		.040		1.02	
TL	.028	.048	0.71	1.22	7
TW	.036	.046	0.91	1.17	8, 9
r		.010		0.25	9, 10
$\alpha$	45° TP		45° TP		



**NOTES:**

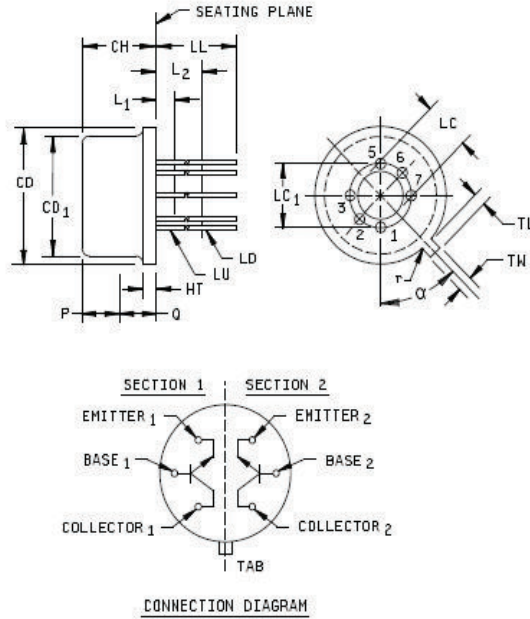
- Dimensions are in inches. Millimeters are given for general information only.
- Terminal 1 is emitter, terminal 2 is base, and terminal 3 is collector.
- Terminal 3 (collector) is electrically connected to case.
- Leads at gauge plane .054 inch (1.37 mm) +.001 inch (0.03 mm) -.000 inch (0.00 mm) below seating plane shall be within .007 inch (0.18 mm) radius of TP relative to tab. Device may be measured by direct methods or by gauge.
- All three leads.
- Dimension LU applies between L1 and L2. Dimension LD applies between L2 and LL minimum.
- Dimension TL is measured from dimension HD maximum.
- Details of outline in this zone are optional.
- Beyond r (radius) maximum, dimension TW shall be held for a minimum length of .011 inch (0.28 mm).
- Dimension r (radius) applied to both inside corners of tab.
- In accordance with ASME Y14.5M, diameters are equivalent to  $\phi$ x symbol.

## TO-66



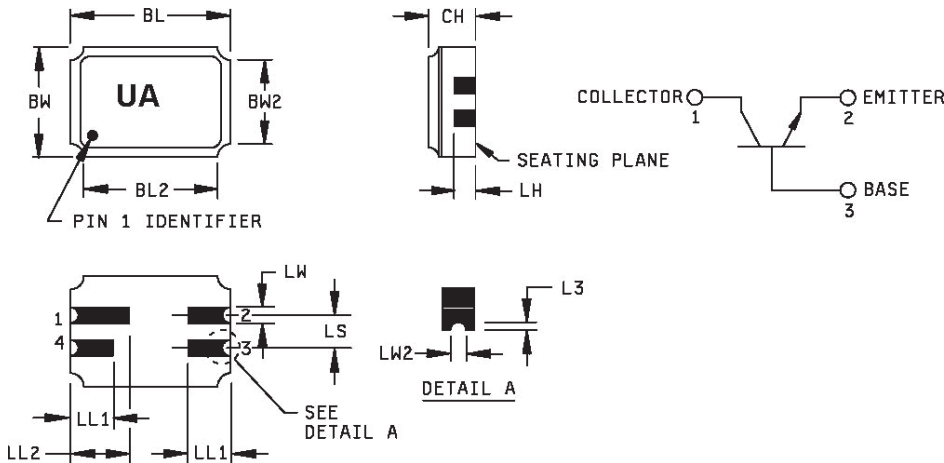
LTR	Dimensions			
	Inches		Millimeters	
	MIN	MAX	MIN	MAX
CD		.875		15.75
CH	.250	.340	6.35	8.64
HT	.050	.075	1.27	1.91
HR		.350		8.89
HR1	.115	.145	2.92	3.68
LD	.028	.034	0.71	0.86
LL	.360	.500	9.14	12.70
L1		.050		1.27
MHD	.142	.152	3.61	3.86
MHS	.958	.962	24.33	24.43
PS	.190	.210	4.83	5.33
PS1	.095	.105	2.41	2.66
S1	.570	.590	14.48	14.99

## TO-78



Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	.335	.370	8.51	9.40	
CD <sub>1</sub>	.305	.335	7.75	8.51	
CH	.140	.260	3.56	6.60	
HT	.009	.041	0.23	1.04	
LC	.140	.160	3.56	4.06	
LC <sub>1</sub>	.200 TP		5.08 TP		9
LD	.016	.021	.041	0.53	10
LL	See notes 10, 11, and 12				
LU	.016	.019	0.41	0.48	10
L <sub>1</sub>		.050		1.27	10
L <sub>2</sub>	.250		6.35		10
P	.100		2.54		8
Q		.050		1.27	7
TL	.029	.045	0.74	1.14	5, 6
TW	.028	.034	0.71	0.86	4, 5
r		.010		0.25	
α	45°TP		45°TP		9

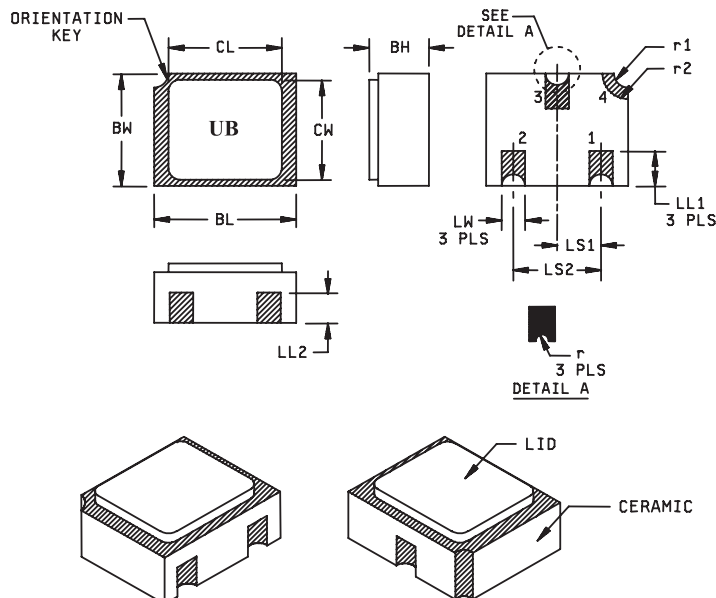
## UA



Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BL	.215	.225	5.46	5.71
BL2		.225		5.71
BW	.145	.155	3.68	3.93
BW2		.155		3.93
CH	.061	.075	1.55	1.90
L3	.003	.007	0.08	0.18
LH	.029	.042	0.74	1.07
LL1	.032	.048	0.81	1.22
LL2	.072	.088	1.83	2.23
LS	.045	.055	1.14	1.39
LW	.022	.028	0.56	0.71
LW2	.006	.022	0.15	0.56

Pin no.	1	2	3	4
Transistor	Collector	Emitter	Base	N/C

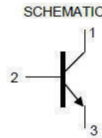
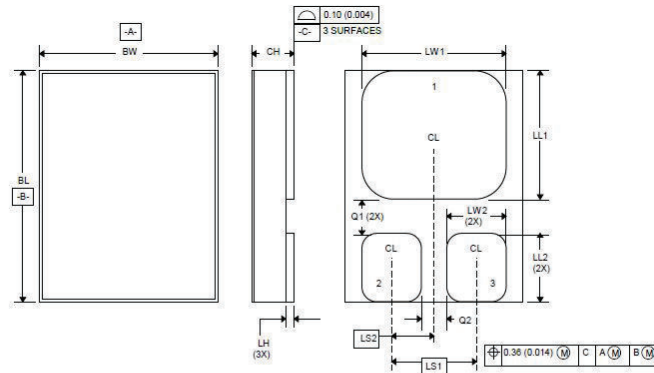
## UB



Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BH	.046	.056	1.17	1.42
BL	.115	.128	2.92	3.25
BW	.085	.108	2.16	2.74
CL		.128		3.25
CW		.108		2.74
LL1	.022	.038	0.56	0.96
LL2	.017	.035	0.43	0.89
LS <sub>1</sub>	.036	.040	0.91	1.02
LS <sub>2</sub>	.071	.079	1.81	2.01
LW	.016	.024	0.41	0.61
r		.008		.203
r <sub>1</sub>		.012		.305
r <sub>2</sub>		.022		.559

# Transistor Packaging

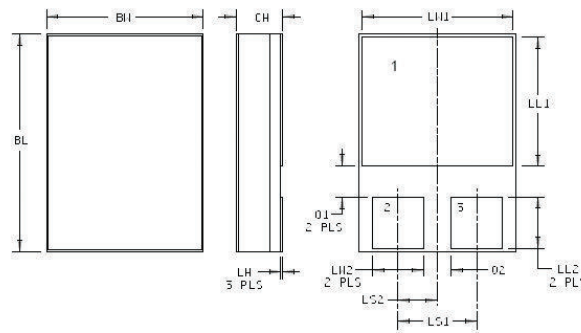
## U3/SMD.5



Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BL	.395	.405	10.04	10.28
BW	.291	.301	7.40	7.64
CH	.1085	.1205	2.76	3.06
LH	.010	.020	0.25	0.51
LW1	.281	.291	7.14	7.39
LW2	.090	.100	2.29	2.54
LL1	.220	.230	5.59	5.84
LL2	.115	.125	2.93	3.17
LS1	150 BSC		3.81 BSC	
LS2	.075 BSC		1.91 BSC	
Q1	.030		0.762	
Q2	.030		0.762	

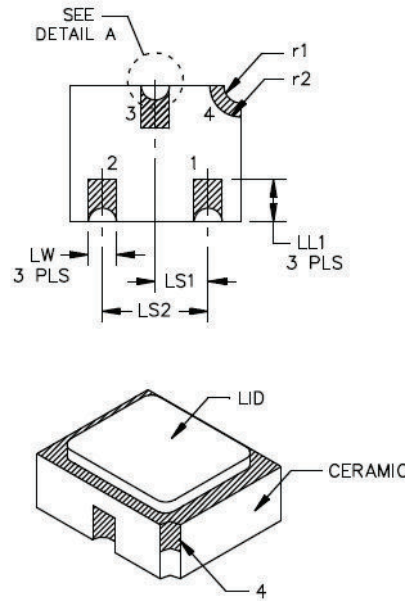
- NOTES:
1. Dimensions are in inches.
  2. Millimeters are given for general information only.
  3. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi$ x symbology.
  4. Terminal 1 - collector, terminal 2 - base, terminal 3 - emitter.

## U4/SMD.22



Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
BL	.215	.225	5.46	5.72
BW	.145	.155	3.68	3.94
CH	.049	.075	1.24	1.91
LH		.020		0.51
LW1	.135	.145	3.43	3.68
LW2	.047	.057	1.19	1.45
LL1	.085	.125	2.16	3.18
LL2	.045	.075	1.14	1.91
LS1	.070	.095	1.78	2.41
LS2	.035	.048	0.89	1.22
Q1	.030	.070	0.76	1.78
Q2	.020	.035	0.51	0.89
1	Collector			
2	Base			
3	Emitter			

- NOTES:
1. Dimensions are in inches.
  2. Millimeters are given for general information only.
  3. Terminal 1 is collector.
  4. Terminal 2 is base.
  5. Terminal 3 is emitter.
  6. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi$ x symbology.



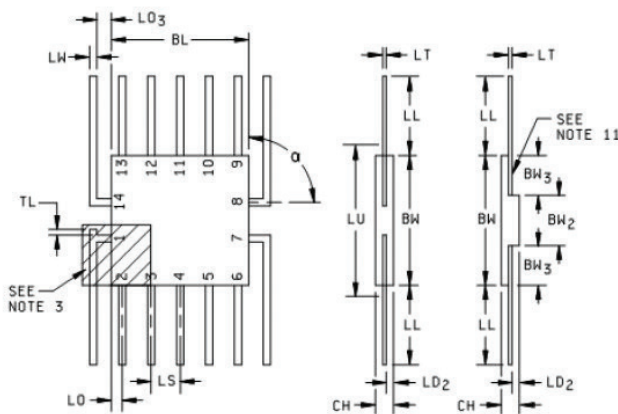
Symbol	Dimensions				Note
	Inches		Millimeters		
	Min	Max	Min	Max	
BH	.046	.056	1.17	1.42	
BL	.115	.128	2.92	3.25	
BW	.085	.108	2.16	2.74	
CL		.128		3.25	
CW		.108		2.74	
LL1	.022	.038	0.56	0.97	
LL2	.017	.035	0.43	0.89	

Symbol	Dimensions				Note
	Inches		Millimeters		
	Min	Max	Min	Max	
LS <sub>1</sub>	.036	.040	0.91	1.02	
LS <sub>2</sub>	.071	.079	1.80	2.01	
LW	.016	.024	0.41	0.61	
r		.008		.203	
r1		.012		.305	
r2		.022		.559	

**NOTES:**

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Hatched areas on package denote metallized areas.
4. Lid material: Kovar.
5. UB only: Pad 1 = Base, Pad 2 = Emitter, Pad 3 = Collector, Pad 4 = Shielding connected to the metal lid.
6. UBN only: Pad 1 = Base, Pad 2 = Emitter, Pad 3 = Collector, Isolated lid with three pads only.
7. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi x$  symbology.

## 14LFP



Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CH	.030	.115	0.76	2.92	
LW	.010	.019	0.25	0.48	7
TL	.008	.015	0.20	0.38	12
BL		.280		7.11	5
BW	.240	.260	6.10	6.60	
LU		.290		7.37	5
BW <sub>2</sub>	.125		3.18		

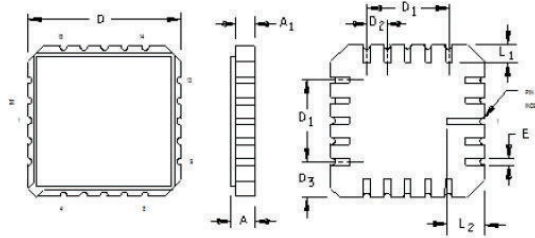
Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
BW <sub>3</sub>	.030		0.76		
LS	.050 BSC		1.27 BSC		6, 8
LT	.003	.006	0.076	0.152	7
LL	.250	.370	6.35	9.40	
LD <sub>2</sub>	.005	.040	0.13	1.02	4
LO	.005		0.13		9, 10
LO <sub>3</sub>	.004		0.10		13
$\alpha$	30°	90°	30°	90°	14

**NOTES:**

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Index area: A notch or pin one identification mark shall be located adjacent to pin one and shall be located within the shaded area shown. The manufacturer's identification shall not be used as a pin one identification mark. Alternatively, a tab (dim TL) may be used to identify pin one.
4. Dimension LD<sub>2</sub> shall be measured at the point of exit of the lead from the body.
5. This dimension allows for off-center lid, meniscus, and glass overrun.
6. The basic pin spacing is .050 inch (1.27 mm) between centerlines. Each pin centerline shall be located within  $\pm 0.005$  inch (0.13 mm) of its exact longitudinal position relative to pins 1 and 14.
7. All leads: Increase maximum limit by .003 inch (0.08 mm) measured at the center of the flat when the lead finish is solder.
8. Twelve spaces.
9. Applies to all four corners (leads number 2, 6, 9, and 13).
10. Dimension LO may be .000 inch (0.00 mm) if leads number 2, 6, 9, and 13) bend toward the cavity of the package within one lead width from the point of entry of the lead into the body or if the leads are brazed to the metallized ceramic body.
11. No organic or polymeric materials shall be molded to the bottom of the package to cover the leads.
12. Optional, see note 1. If a pin one identification mark is used in addition to this tab, the minimum limit of dimension TL does not apply.
13. Applies to leads number 1, 7, 8, and 14.
14. Lead configuration is optional within dimension BW except dimensions LW and LT apply.
15. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi x$  symbology.
16. Pins 1, 7, 8, and 14 are collectors.
17. Pins 2, 6, 9, and 13 are bases.
18. Pins 3, 5, 10, and 12 are emitters.
19. Pins 4 and 11 are no contacts.

# Transistor Packaging

## 20PLC

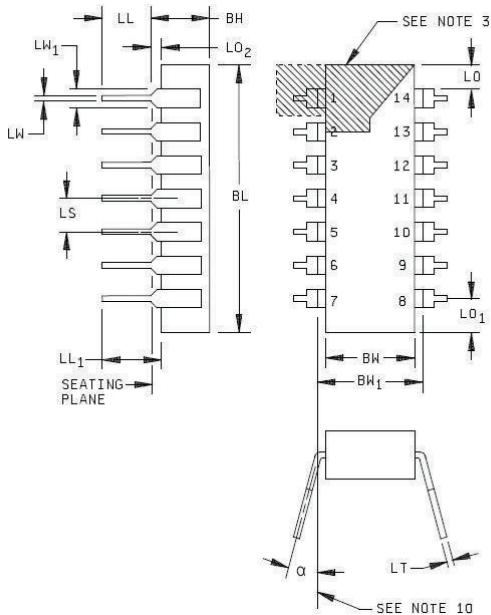


Symbol	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.073	.085	1.85	2.16
A <sub>1</sub>	.063	.075	1.60	1.91
D	.345	.355	8.76	9.02
D <sub>1</sub>	.195	.205	4.95	5.21
D <sub>2</sub>	.050 TYP		1.27 TYP	
D <sub>3</sub>	.070	.080	1.78	2.03
E	.025 REF		0.64 REF	
L <sub>1</sub>	.050 REF for pins 2 through 20		1.27 REF for pins 2 through 20	
L <sub>2</sub>	.080	.090	2.03	2.29

**NOTES:**

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Unless otherwise specified, tolerance is  $\pm 0.005$  inch (0.13 mm).
4. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi x$  symbology.

## TO-116



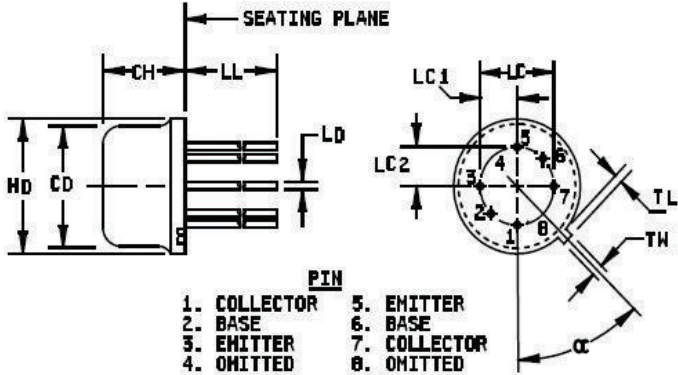
Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
BH		.200		5.08	
LW	.014	.023	0.36	0.58	10
LW <sub>1</sub>	.030	.070	0.76	1.78	4, 10
LT	.008	.015	0.20	0.38	10
BL		.785		19.94	6
BW	.220	.310	5.59	7.87	6
BW <sub>1</sub>	.290	.320	7.37	8.13	9

Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
LS	.100 BSC		2.54 BSC		7, 11
LL	.125	.200	3.18	5.08	
LL <sub>1</sub>	.150		3.81		
LO	.005		0.13		8
LO <sub>1</sub>		.098		2.49	8
LO <sub>2</sub>	.015	.060	0.38	1.52	5
$\alpha$	0°	15°	0°	15°	

**NOTES:**

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Index area: A notch or pin one identification mark shall be located adjacent to pin one and shall be located within the shaded area shown. The manufacturer's identification shall not be used as a pin one identification mark.
4. The minimum limit for dimension LW<sub>1</sub> may be .023 inch (0.58 mm) for leads number 1, 7, 8, and 14 only.
5. Dimension LO<sub>2</sub> shall be measured from the seating plane to the base plane.
6. This dimension allows for off-center lid, meniscus, and glass overrun.
7. The basic pin spacing is .100 inch (2.54 mm) between centerlines. Each pin centerline shall be located within  $\pm 0.010$  inch (0.25 mm) of its exact longitudinal position relative to pins 1 and 14.
8. Applies to all four corners (leads number 1, 7, 8, and 14).
9. Lead center when  $\alpha$  is 0 degrees. BW<sub>1</sub> shall be measured at the centerline of the leads.
10. All leads.
11. Twelve spaces.
12. No organic or polymeric materials shall be molded to the bottom of the package to cover the leads.
13. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi x$  symbology.

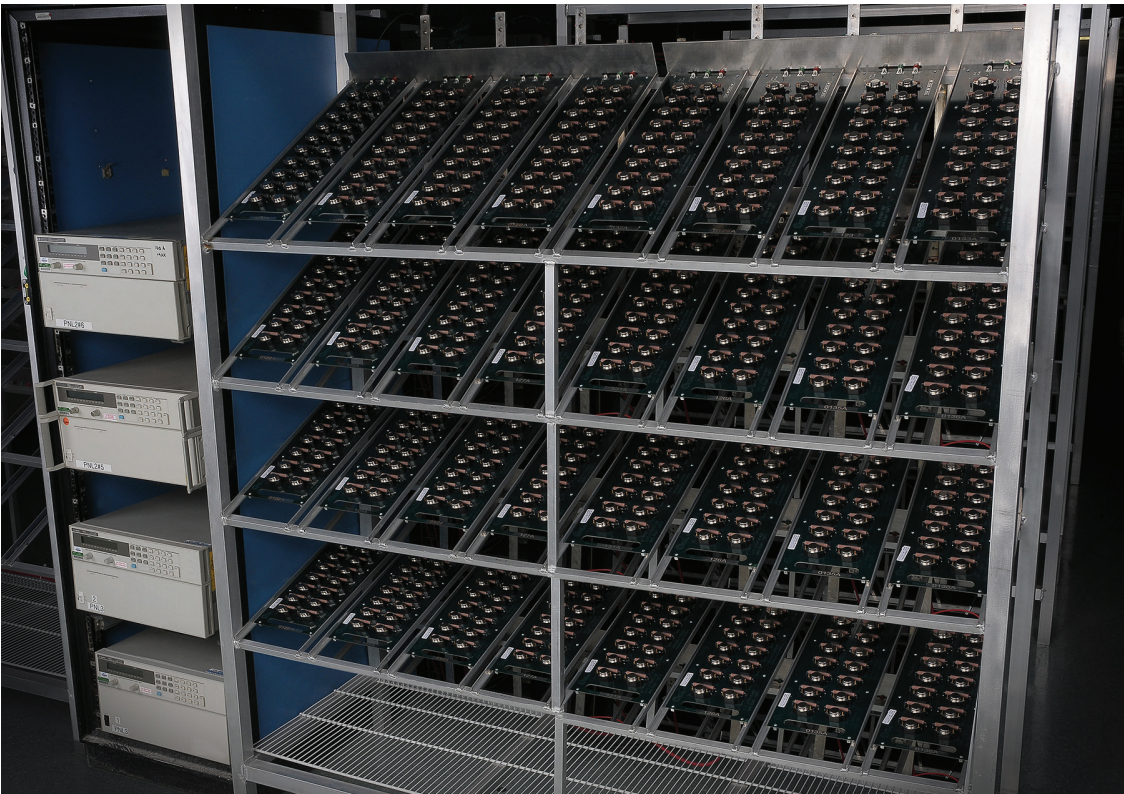
## TO-99



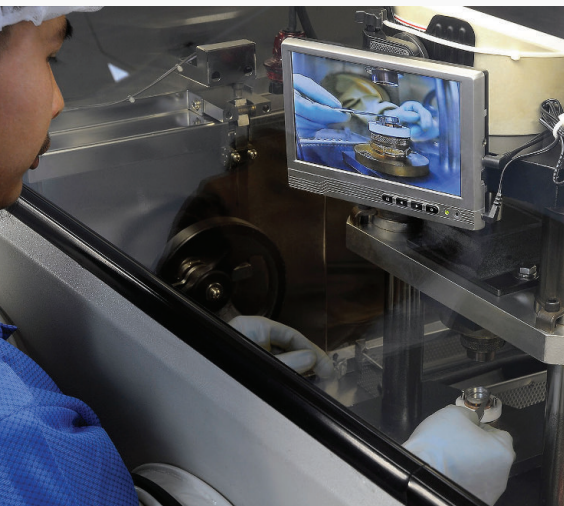
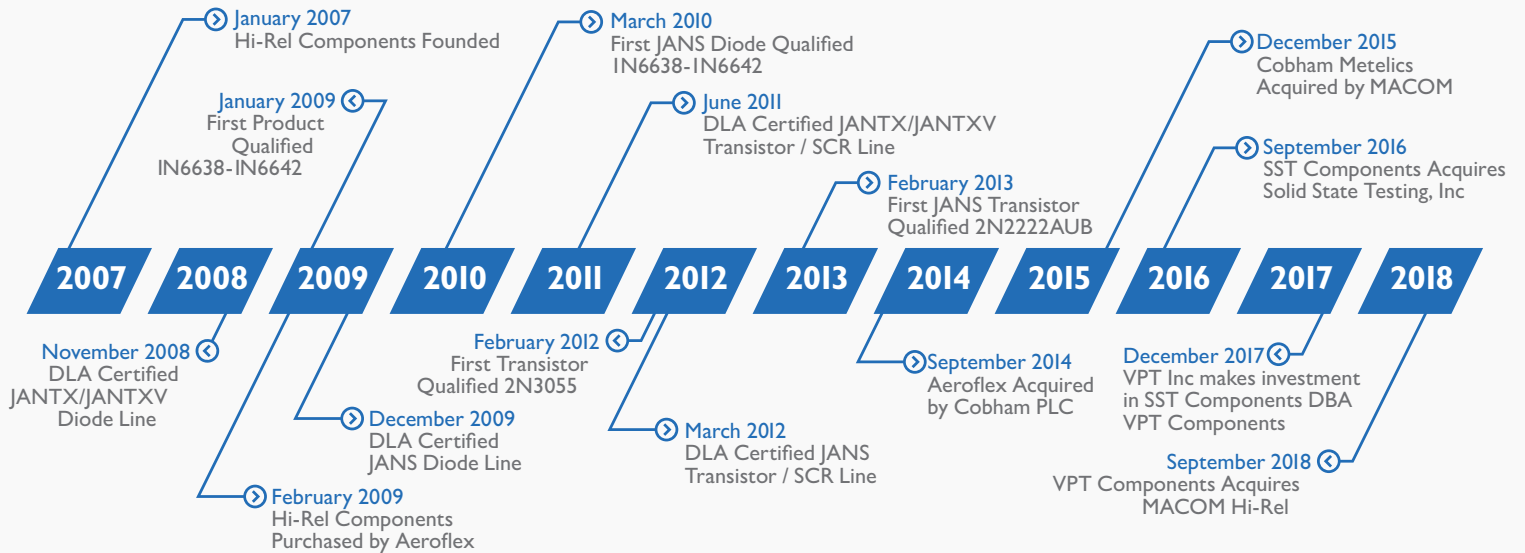
Symbol	Dimensions				Note
	Inches		Millimeters		
CD	.305	.335	7.75	8.51	
CH	.150	.185	3.81	4.70	
HD	.335	.370	8.51	9.40	
LD	.016	.021	0.41	0.53	
LL	.500		12.70		
LC	.200	BSC	5.08	BSC	4
LC1	.100	BSC	2.54	BSC	
LC2	.100	BSC	2.54	BSC	
TL	.029	.045	0.74	1.14	3
TW	.028	.034	0.71	0.86	
$\alpha$	45° TP		45° TP		6

**NOTES:**

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Measured from maximum diameter of the product.
4. Leads having maximum diameter .019 inch (.483 mm) measured in gaging plan .054 inch (1.37 mm) + .001 inch (.025 mm) - .000 inch (.000 mm) below the seating plane of the product shall be within .007 inch (.178 mm) of their true position relative to a maximum width tab.
5. The product may be measured by direct methods or by gauge.
6. Tab centerline.
7. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi x$  symbology.



## Our History



## Quality Statement

VPT Components is dedicated to customer satisfaction by producing reliable products that are delivered on-time and at an exceptional value. With diligence, experience, and teamwork, we are committed to performing at the highest standards of excellence. We take pride in maintaining our Quality Management System and quality objectives, while seeking continual improvement. Our success is driven by quality-focused management, employee dedication, and supplier commitment.

## REACH Regulation 1907/2006

VPT Components understands and recognizes the importance of the REACH regulation (Registration, Evaluation, Authorization and Restriction of Chemicals) to our European customers. We have completed both a REACH Product Survey and Industrial Process Survey for a major European space customer. We have created an internal REACH certificate for our European customers that is available for review (LWI5200) per European Chemical Agency (ECHA).

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