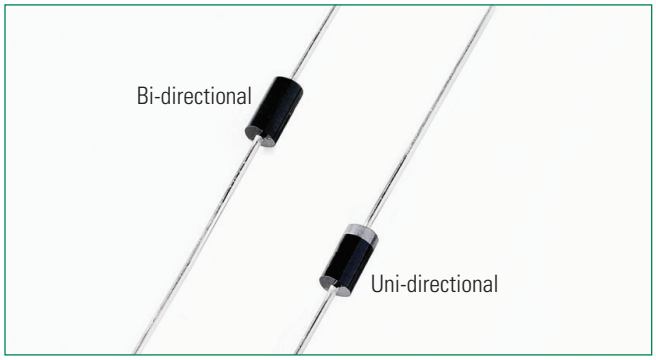
P6KE Series



Agency Approvals

Agency	Agency File Number
	E230531

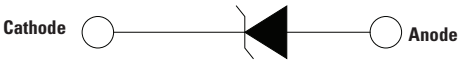
Maximum Ratings and Thermal Characteristics (T_A=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation(Fig.2) by 10/1000us Test Waveform(Fig.4)(Note 1) -Single Die Parts	P_{PPM}	600	W
Peak Pulse Power Dissipation(Fig.2) by 10/1000us Test Waveform(Fig.4)(Note 1) -Stacked Die Parts(Note 4)	P_{PPM}	800	W
Steady State Power Dissipation on Infinite Heat Sink at T_L=75°C	P_D	5.0	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave Unidirectional Only (Note 2)	I_{FSM}	100	A
Maximum Instantaneous Forward Voltage at 50A for Unidirectional Only (Note 3)	V_F	3.5/5.0	V
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	°C
Typical Thermal Resistance Junction to Lead	$R_{\theta JL}$	20	°C/W
Typical Thermal Resistance Junction to Ambient	$R_{\theta JA}$	75	°C/W

Notes:
1. Non-repetitive current pulse , per Fig. 4 and derated above T_J (initial) = 25°C per Fig. 3.
2. Measured on 8.3ms single half sine wave or equivalent square wave, duty cycle=4 per minute maximum.
3. V_F < 3.5V for single die parts and V_F< 5.0V for stacked-die parts.
4. For stacked die component details, please refer to part numbers labeled by * in Electrical Characteristics.

Functional Diagram

Bi-directional



Uni-directional

Description

The P6KE Series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

Features

- 600W peak pulse capability at 10/1000µs waveform, repetition rate (duty cycles):0.01%
- Glass passivated chip junction in DO-15 Package
- Fast response time: typically less than 1.0ps from 0 Volts to BV min
- Excellent clamping capability
- Typical failure mode is short from over-specified voltage or current
- Whisker test conducted based on Table 4a and 4c of JEDEC JESD201A
- IEC 61000-4-2 ESD 30kV(Air), 30kV (Contact)
- EFT protection of data lines in accordance with IEC 61000-4-4
- Low incremental surge resistance
- Typical I_R less than 1µA when V_{BR} min>12V
- Compatible with high temperature reflow soldering (260°C/30 s)
- V_{BR} @ T_J= V_{BR}@25°C x (1+αT x (T_J - 25)) (αT:Temperature Coefficient, typical value is 0.1%)
- UL Recognized epoxy meeting flammability classification V-0
- Matte tin lead–free plated
- Halogen free and RoHS compliant
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/JEDEC J-STD-609A.01)

Applications

TVS components are ideal for the protection of I/O interfaces, V_{CC} bus and other vulnerable circuits used in telecom, computer, industrial and consumer electronic applications.

Additional Infomarion

Datasheet | Resources | Samples

© 2020 Littelfuse, Inc.
Specifications are subject to change without notice.
Revised: JC.10/26/20

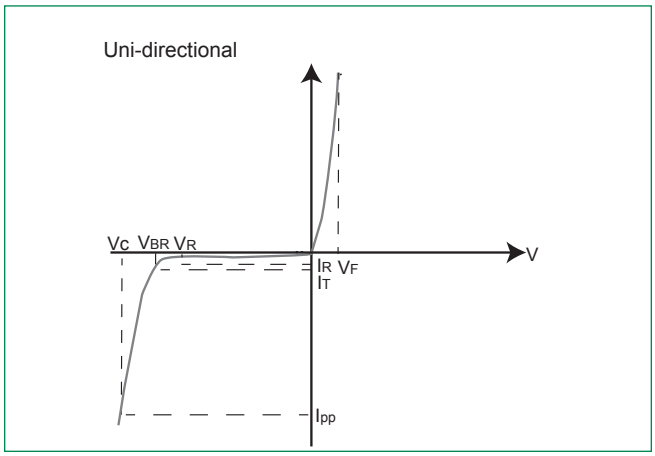
Electrical Characteristics (T_A=25°C unless otherwise noted)

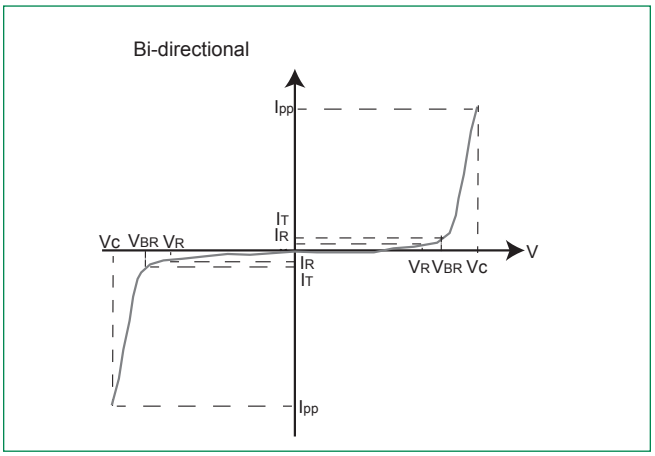
Part Number (Uni)	Part Number (Bi)	Reverse Stand off Voltage V_R (Volts)	Breakdown Voltage V_{BR} (Volts) @ I_T		Test Current I_T (mA)	Maximum Clamping Voltage V_C @ I_{PP} (V)	Maximum Peak Pulse Current I_{PP} (A)	Maximum Reverse Leakage I_R@ V_R (µA)	Agency Approval
			Min.	Max.					
P6KE6.8A	P6KE6.8CA	5.80	6.45	7.14	10	10.5	58.1	1000	X
P6KE7.5A	P6KE7.5CA	6.40	7.13	7.88	10	11.3	54.0	500	X
P6KE8.2A	P6KE8.2CA	7.02	7.79	8.61	10	12.1	50.4	200	X
P6KE9.1A	P6KE9.1CA	7.78	8.65	9.55	1	13.4	45.5	50	X
P6KE10A	P6KE10CA	8.55	9.50	10.50	1	14.5	42.1	10	X
P6KE11A	P6KE11CA	9.40	10.50	11.60	1	15.6	39.1	5	X
P6KE12A	P6KE12CA	10.20	11.40	12.60	1	16.7	36.5	5	X
P6KE13A	P6KE13CA	11.10	12.40	13.70	1	18.2	33.5	1	X
P6KE15A	P6KE15CA	12.80	14.30	15.80	1	21.2	28.8	1	X
P6KE16A	P6KE16CA	13.60	15.20	16.80	1	22.5	27.1	1	X
P6KE18A	P6KE18CA	15.30	17.10	18.90	1	25.2	24.2	1	X
P6KE20A	P6KE20CA	17.10	19.00	21.00	1	27.7	22.0	1	X
P6KE22A	P6KE22CA	18.80	20.90	23.10	1	30.6	19.9	1	X
P6KE24A	P6KE24CA	20.50	22.80	25.20	1	33.2	18.4	1	X
P6KE27A	P6KE27CA	23.10	25.70	28.40	1	37.5	16.3	1	X
P6KE30A	P6KE30CA	25.60	28.50	31.50	1	41.4	14.7	1	X
P6KE33A	P6KE33CA	28.20	31.40	34.70	1	45.7	13.3	1	X
P6KE36A	P6KE36CA	30.80	34.20	37.80	1	49.9	12.2	1	X
P6KE39A	P6KE39CA	33.30	37.10	41.00	1	53.9	11.3	1	X
P6KE43A	P6KE43CA	36.80	40.90	45.20	1	59.3	10.3	1	X
P6KE47A	P6KE47CA	40.20	44.70	49.40	1	64.8	9.4	1	X
P6KE51A	P6KE51CA	43.60	48.50	53.60	1	70.1	8.7	1	X
P6KE56A	P6KE56CA	47.80	53.20	58.80	1	77.0	7.9	1	X
P6KE62A	P6KE62CA	53.00	58.90	65.10	1	85.0	7.2	1	X
P6KE68A	P6KE68CA	58.10	64.60	71.40	1	92.0	6.6	1	X
P6KE75A	P6KE75CA	64.10	71.30	78.80	1	103.0	5.9	1	X
P6KE82A	P6KE82CA	70.10	77.90	86.10	1	113.0	5.4	1	X
P6KE91A	P6KE91CA	77.80	86.50	95.50	1	125.0	4.9	1	X
P6KE100A	P6KE100CA	85.50	95.00	105.00	1	137.0	4.5	1	X
P6KE110A	P6KE110CA	94.00	105.00	116.00	1	152.0	4.0	1	X
P6KE120A	P6KE120CA	102.00	114.00	126.00	1	165.0	3.7	1	X
P6KE130A	P6KE130CA	111.00	124.00	137.00	1	179.0	3.4	1	X
P6KE150A	P6KE150CA	128.00	143.00	158.00	1	207.0	2.9	1	X
P6KE160A	P6KE160CA	136.00	152.00	168.00	1	219.0	2.8	1	X
P6KE170A	P6KE170CA	145.00	162.00	179.00	1	234.0	2.6	1	X
P6KE180A	P6KE180CA	154.00	171.00	189.00	1	246.0	2.5	1	X
P6KE200A	P6KE200CA	171.00	190.00	210.00	1	274.0	2.2	1	X
P6KE220A	P6KE220CA	185.00	209.00	231.00	1	328.0	1.9	1	X
P6KE250A	-	214.00	237.00	263.00	1	344.0	1.8	1	X
	P6KE250CA*	214.00	237.00	263.00	1	344.0	2.4	1	X
P6KE300A	-	256.00	285.00	315.00	1	414.0	1.5	1	X
	P6KE300CA*	256.00	285.00	315.00	1	414.0	2.0	1	X
P6KE350A*	P6KE350CA*	300.00	332.00	368.00	1	482.0	1.7	1	X
P6KE400A*	P6KE400CA*	342.00	380.00	420.00	1	548.0	1.5	1	X
P6KE440A*	P6KE440CA*	376.00	418.00	462.00	1	602.0	1.4	1	X
P6KE480A*	P6KE480CA*	408.00	456.00	504.00	1	658.0	1.3	1	X
P6KE510A*	P6KE510CA*	434.00	485.00	535.00	1	698.0	1.2	1	X
P6KE530A*	P6KE530CA*	451.00	503.50	556.50	1	725.0	1.2	1	X
P6KE540A*	P6KE540CA*	460.00	513.00	567.00	1	740.0	1.1	1	X
P6KE550A*	P6KE550CA*	468.00	522.50	577.50	1	760.0	1.1	1	X
P6KE600A*	P6KE600CA*	512.00	570.00	630.00	1	828.0	1.0	1	-

For bidirectional type having V_R of 10 volts and less, the I_R limit is double.
For parts without A , the V_{BR} is ± 10% and V_C is 5% higher than with A parts, the parts without A are currently available, but not recommended for new designs. The parts with A are preferred.
For stack-die parts, use * to label the part number.

© 2020 Littelfuse, Inc.
Specifications are subject to change without notice.

I-V Curve Characteristics





P_{PPM} Peak Pulse Power Dissipation – Max power dissipation
V_R Stand-off Voltage – Maximum voltage that can be applied to the TVS without operation
V_{BR} Breakdown Voltage – Maximum voltage that flows though the TVS at a specified test current (I_T)
V_C Clamping Voltage – Peak voltage measured across the TVS at a specified Ippm (peak impulse current)
I_R Reverse Leakage Current – Current measured at V_R
V_F Forward Voltage Drop for Uni-directional

Ratings and Characteristic Curves (T_A=25°C unless otherwise noted)

Figure 1 - TVS Transients Clamping Waveform

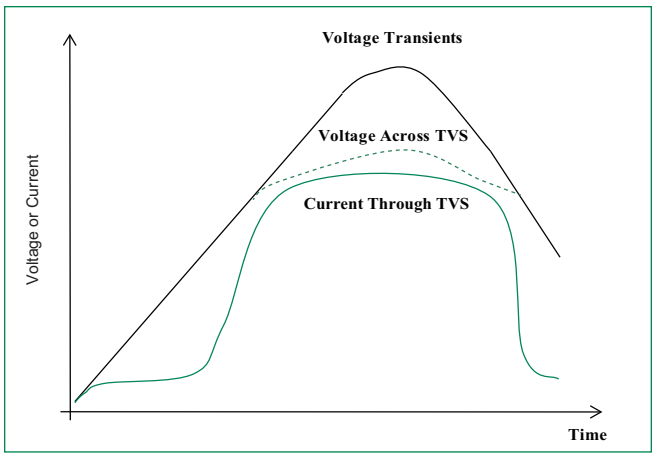
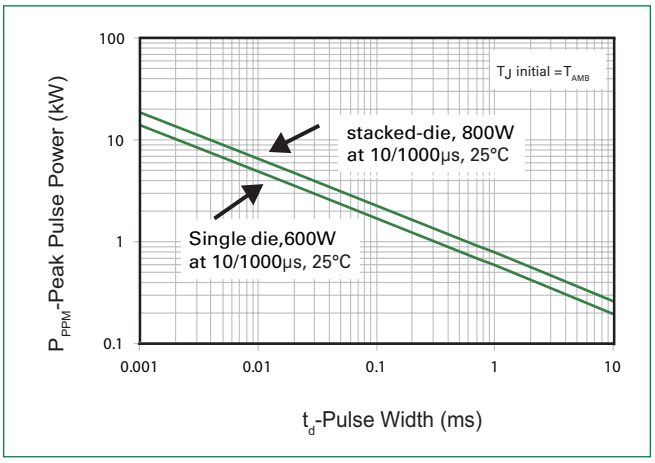


Figure 2 - Peak Pulse Power Rating



© 2020 Littelfuse, Inc.
Specifications are subject to change without notice.

Ratings and Characteristic Curves (T_A=25°C unless otherwise noted) (Continued)

Figure 3 - Peak Pulse Power Derating Curve

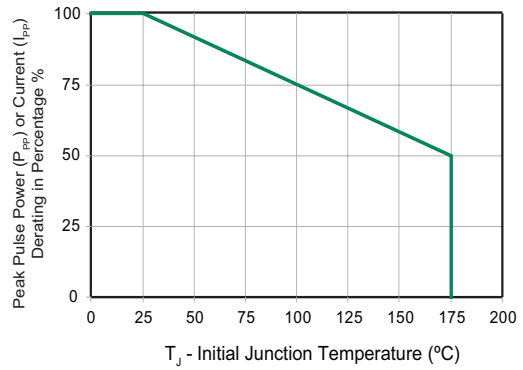


Figure 4 - Pulse Waveform

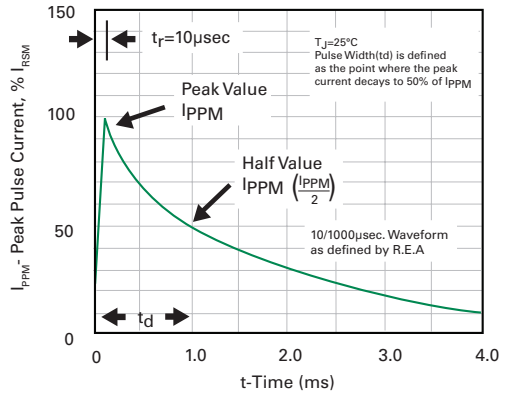


Figure 5 - Typical Junction Capacitance

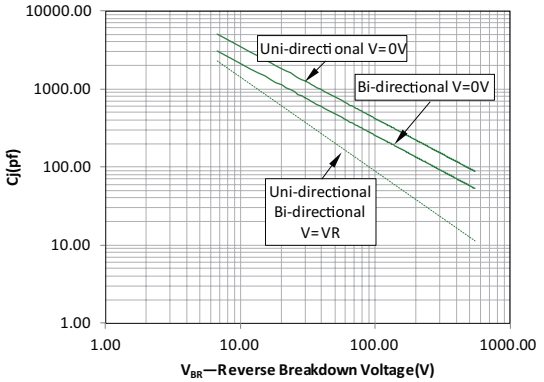


Figure 6 - Typical Transient Thermal Impedance

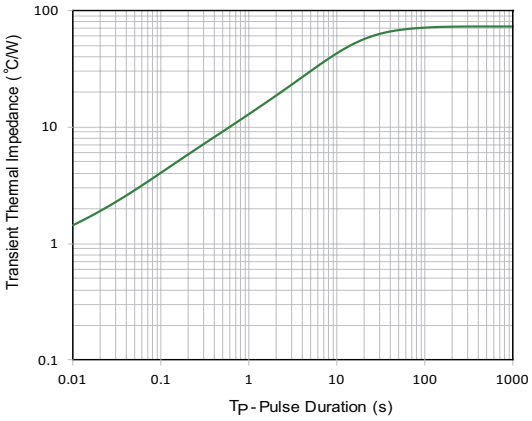


Figure 7 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only

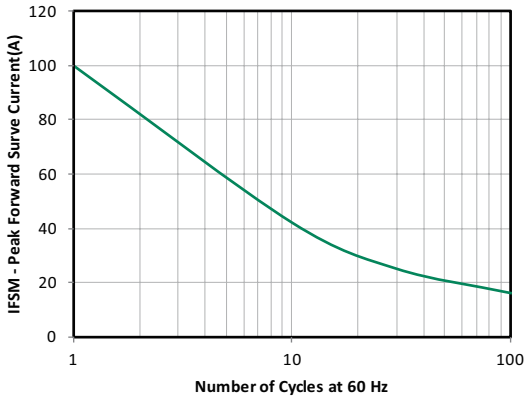
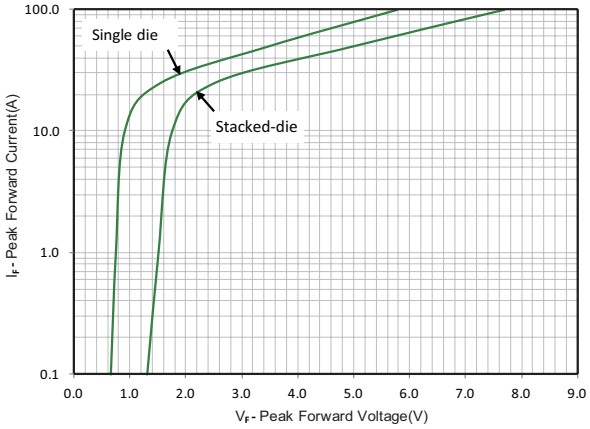


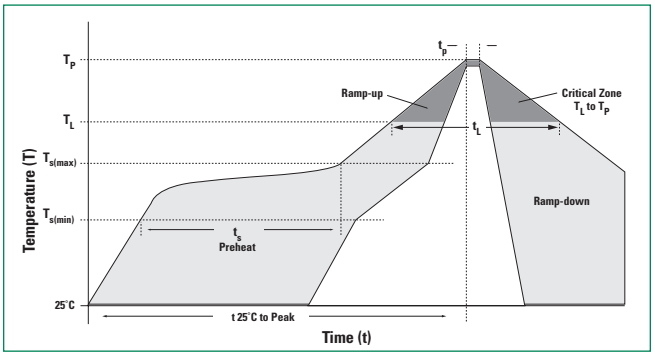
Figure 8 - Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)



© 2020 Littelfuse, Inc.
Specifications are subject to change without notice.

Soldering Parameters

Reflow Condition		Lead–free assembly
Pre Heat	**- Temperature Min ($T_{s(min)}$)**	150°C
	- Temperature Max ($T_{s(max)}$)	200°C
	- Time (min to max) (t_s)	60 – 120 secs
Average ramp up rate (Liquidus Temp (T_L) to peak		3°C/second max
$T_{S(max)}$ to T_L - Ramp-up Rate		3°C/second max
Reflow	**- Temperature (T_L) (Liquidus)**	217°C
	- Time (min to max) (t_L)	60 – 150 seconds
Peak Temperature (T_P)		$260^{+0/-5}$ °C
Time within 5°C of actual peak Temperature (t_p)		30 Seconds Max
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature (T_P)		8 minutes Max.
Do not exceed		260°C



Flow/Wave Soldering (Solder Dipping)

Peak Temperature :	265°C
Dipping Time :	10 seconds
Soldering :	1 time

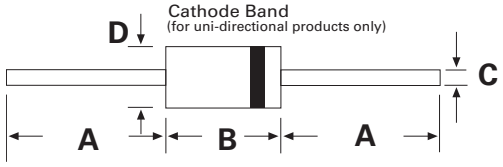
Physical Specificationst C

Weight	0.015oz., 0.4g
Case	JEDEC DO-204AC (DO-15) molded plastic body over passivated junction.
Polarity	Color band denotes the cathode except Bipolar.
Terminal	Matte Tin axial leads, solderable per JESD22-B102.

Environmental Specifications

High Temp. Storage	JESD22-A103
HTRB	JESD22-A108
Temperature Cycling	JESD22-A104
H3TRB	JESD22-A101
RSH	JESD22-B106

Dimensions

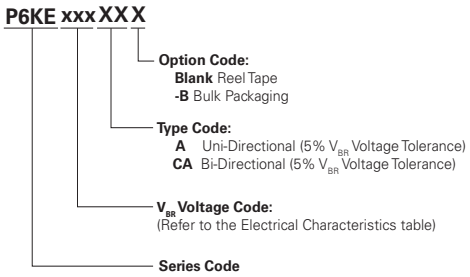


DO-204AC (DO-15)

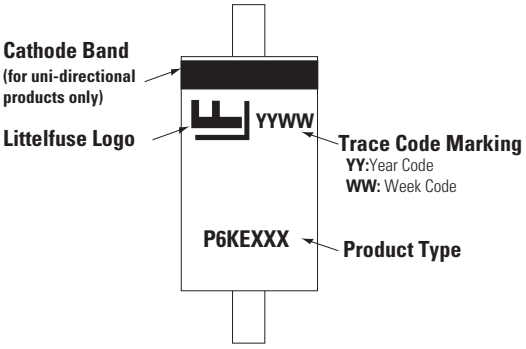
Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	1.000	-	25.40	-
B	0.230	0.300	5.80	7.60
C	0.028	0.034	0.71	0.86
D	0.104	0.140	2.60	3.60

© 2020 Littelfuse, Inc.
Specifications are subject to change without notice.

Part Numbering System



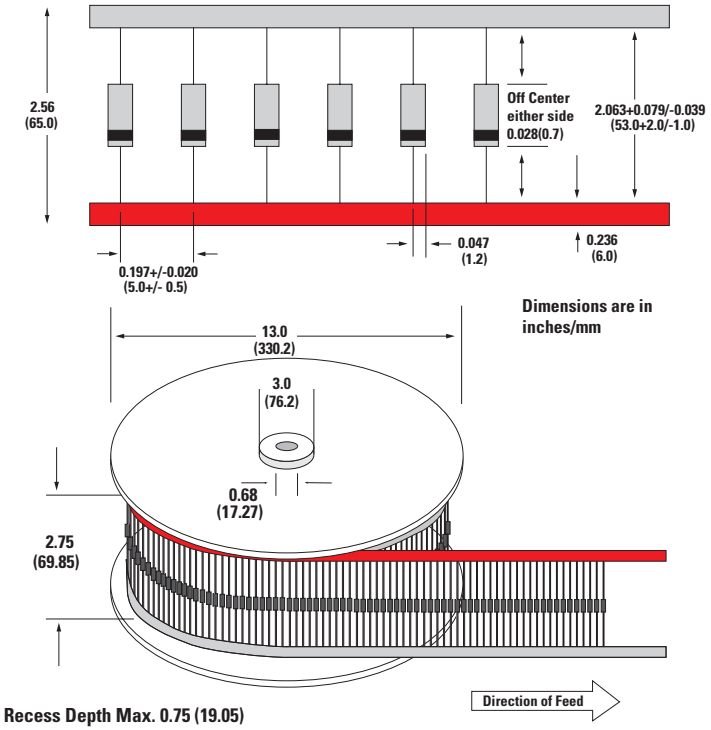
Part Marking System



Packaging

Part Number	Component Package	Quantity	Packaging Option	Packaging Specification
P6KExxxXX	DO-204AC	4000	Tape & Reel	EIA STD RS-296
P6KExxxXX-B	DO-204AC	1000	BULK	Littelfuse Spec.

Tape and Reel Specification



Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at http://www.littelfuse.com/disclaimer-electronics.

© 2020 Littelfuse, Inc.
Specifications are subject to change without notice.
Revised: JC.10/26/20