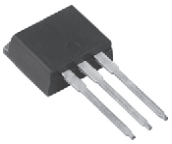
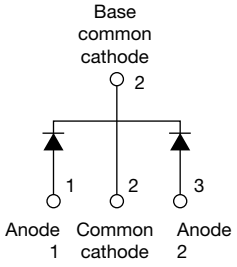
VS-MURB1020CTHM3, VS-MURB1020CT-1HM3

Ultrafast Rectifier, 2 x 5 A FRED Pt®

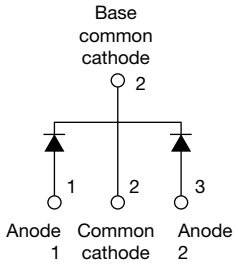
D²PAK (TO-263AB)



TO-262AA



VS-MURB1020CTHM3



VS-MURB1020CT-1HM3

FEATURES

- Ultrafast recovery time
- Low forward voltage drop
- Low leakage current
- 175 °C operating junction temperature
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified
- Meets JESD 201 class 1 whisker test
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT
HALOGEN FREE

DESCRIPTION / APPLICATIONS

MUR.. series are the state of the art ultrafast recovery rectifiers specifically designed with optimized performance of forward voltage drop and ultrafast recovery time. The planar structure and the platinum doped life time control, guarantee the best overall performance, ruggedness and reliability characteristics.

These devices are intended for use in the output rectification stage of SMPS, UPS, DC/DC converters as well as freewheeling diode in low voltage inverters and chopper motor drives.

Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

PRIMARY CHARACTERISTICS	
Package	D²PAK (TO-263AB), TO-262AA
$I_{F(AV)}$	2 x 5 A
V_R	200 V
V_F at I_F	0.87
t_{rr} (typ.)	19 ns
T_J max.	175 °C
Circuit configuration	Common cathode

ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	TEST CONDITIONS	MAX.	UNITS
Peak repetitive reverse voltage		V_{RRM}		200	V
Average rectified forward current	per leg	$I_{F(AV)}$		5	A
	total device		Rated V_R, T_C = 149 °C	10	
Non-repetitive peak surge current per leg		I_{FSM}		50	
Peak repetitive forward current per leg		I_{FM}	Rated V_R, square wave, 20 kHz, T_C = 149 °C	10	
Operating junction and storage temperatures		T_J, T_{Stg}		-65 to +175	°C

ELECTRICAL SPECIFICATIONS (T_J = 25 °C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	V_{BR}, V_R	I_R = 100 µA	200	-	-	V
Forward voltage	V_F	I_F = 5 A, T_J = 25 °C	-	0.99	1.08	
		I_F = 5 A, T_J = 125 °C	-	0.87	0.99	
		I_F = 10 A, T_J = 25 °C	-	1.12	1.25	
		I_F = 10 A, T_J = 125 °C	-	1.02	1.20	
Reverse leakage current	I_R	V_R = V_R rated	-	-	10	µA
		T_J = 150 °C, V_R = V_R rated	-	-	250	
Junction capacitance	C_T	V_R = 200 V	-	8	-	pF
Series inductance	L_S	Measured lead to lead 5 mm from package body	-	8.0	-	nH

DYNAMIC RECOVERY CHARACTERISTICS (T_J = 25 °C unless otherwise specified)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNITS**
Reverse recovery time	t_{rr}	I_F = 1.0 A, dI_F/dt = 100 A/µs, V_R = 30 V		-	19	-	ns
		T_J = 25 °C	I_F = 5 A dI_F/dt = 200 A/µs V_R = 160 V	-	24	-	
		T_J = 125 °C		-	35	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	3.3	-	A
		T_J = 125 °C		-	5.0	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	33	-	nC
		T_J = 125 °C		-	76	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Maximum junction and storage temperature range	T_J, T_{Stg}		-65	-	175	°C
Thermal resistance, junction to case per leg	R_{thJC}		-	-	5	°C/W
Thermal resistance, junction to ambient per leg	R_{thJA}		-	-	50	
Thermal resistance, case to heatsink	R_{thCS}	Mounting surface, flat, smooth and greased	-	0.5	-	
Weight			-	2.0	-	g
			-	0.07	-	oz.
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style D^2PAK (TO-263AB)	MURB1020CTH			
		Case style TO-262AA	MURB1020CT-1H			

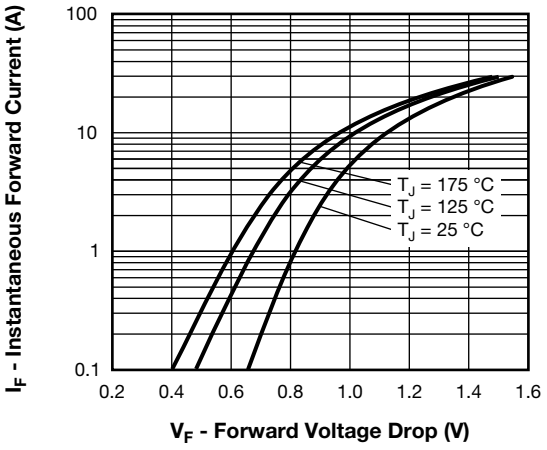


Fig. 1 - Typical Forward Voltage Drop Characteristics

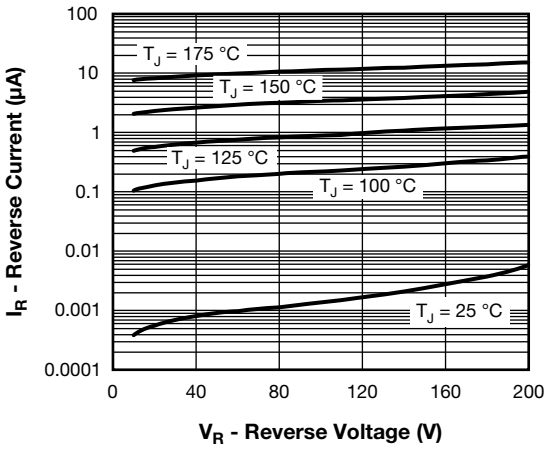


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

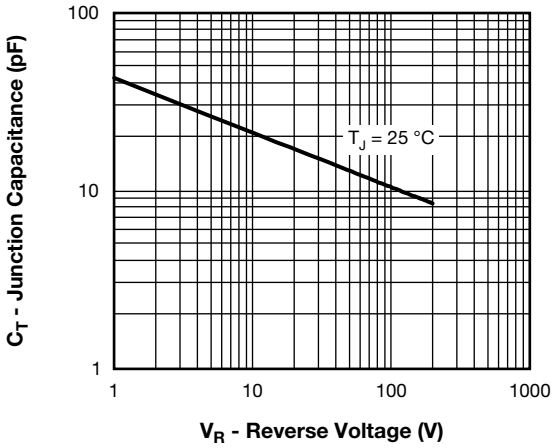


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

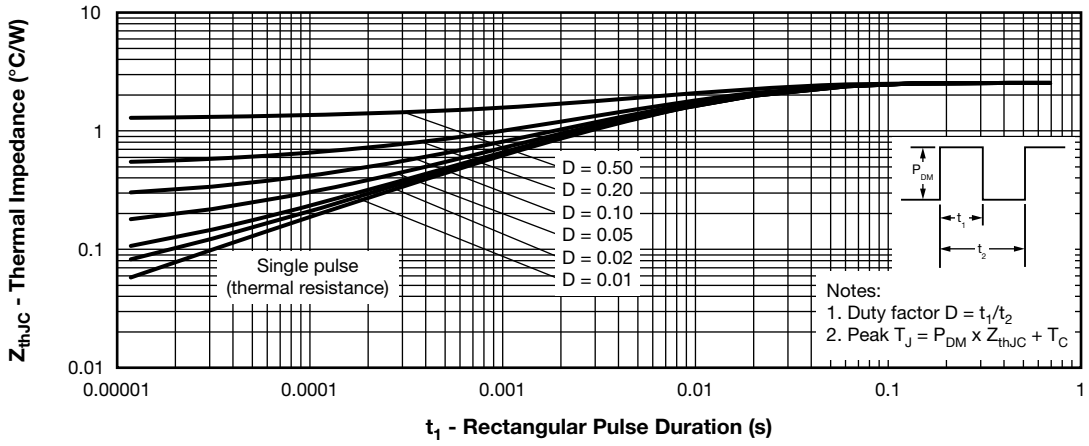


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

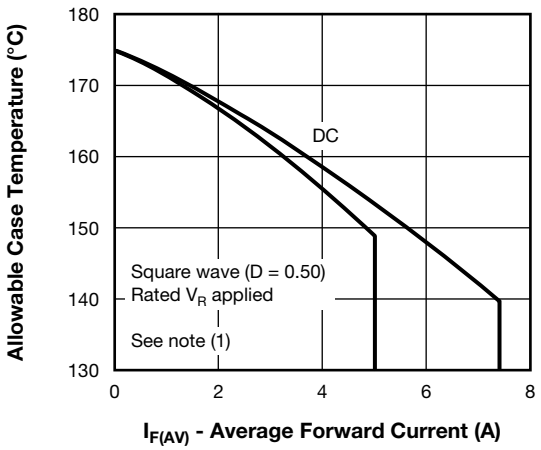


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

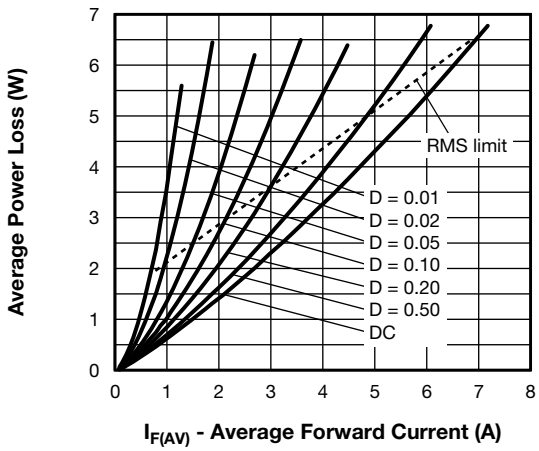


Fig. 6 - Forward Power Loss Characteristics

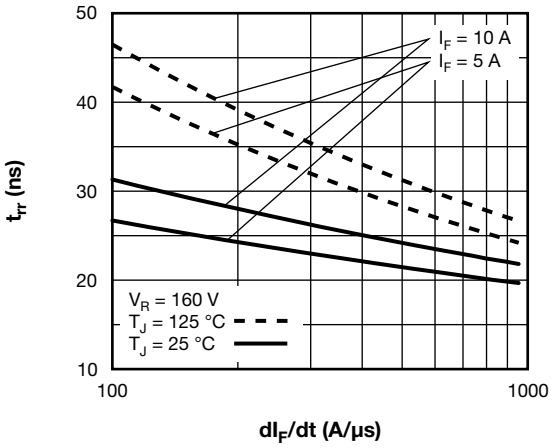


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt

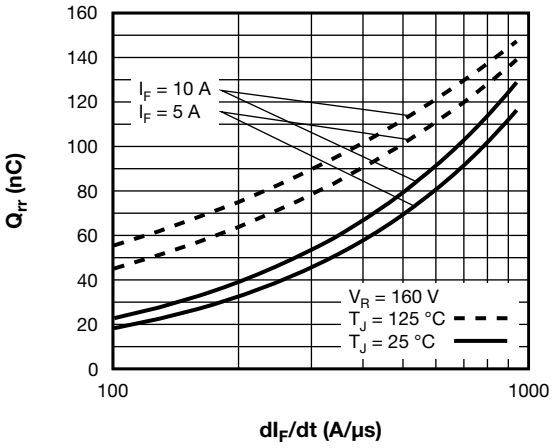
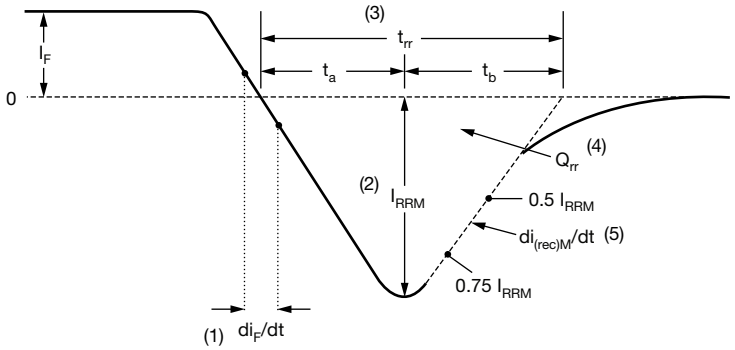


Fig. 8 - Typical Stored Charge vs. dI_F/dt

Note

(1) Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;
Pd = forward power loss = $I_{F(AV)} \times V_{FM}$ at ($I_{F(AV)}$/D) (see fig. 6);
Pd_{REV} = inverse power loss = $V_{R1} \times I_R (1 - D)$; I_R at V_{R1} = rated V_R



(1) di_F/dt - rate of change of current through zero crossing

(2) I_{RRM} - peak reverse recovery current

(3) t_{rr} - reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current.

(4) Q_{rr} - area under curve defined by t_{rr} and I_{RRM}

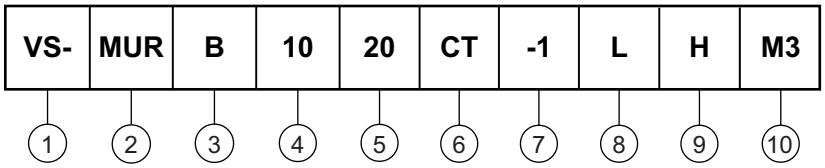
$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

(5) $di_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

Fig. 9 - Reverse Recovery Waveform and Definitions

ORDERING INFORMATION TABLE

Device code



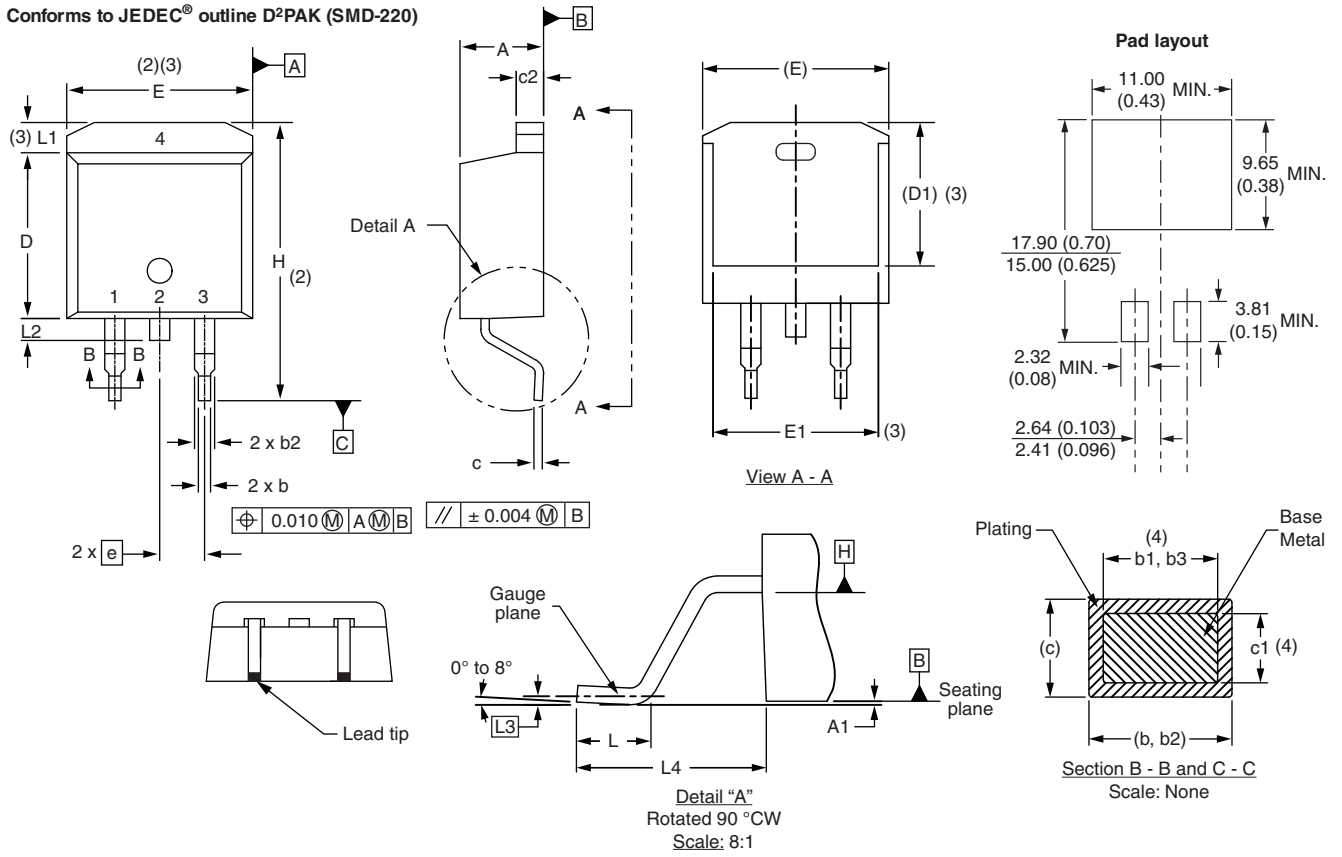
1 - Vishay Semiconductors product
2 - Ultrafast MUR series
3 - B = D^2PAK/TO-262
4 - Current rating (10 = 10 A)
5 - Voltage rating (20 = 200 V)
6 - CT = center tap (dual)
7 - • None = D^2PAK
  • -1 = TO-262
8 - • None = tube (50 pieces)
  • L = tape and reel (left oriented, for D^2PAK package)
  • R = tape and reel (right oriented, for D^2PAK package)
9 - H = AEC-Q101 qualified
10 - Environmental digit:
  • M3 = halogen-free, RoHS-compliant, and terminations lead(Pb)-free

ORDERING INFORMATION (Example)		
PREFERRED P/N	**BASE QUANTITY**	**PACKAGING DESCRIPTION**
VS-MURB1020CTHM3	50	Antistatic plastic tube
VS-MURB1020CT-1HM3	50	Antistatic plastic tube
VS-MURB1020CTLHM3	800	13" diameter reel
VS-MURB1020CTRHM3	800	13" diameter reel

LINKS TO RELATED DOCUMENTS		
Dimensions	D^2PAK (TO-263AB)	www.vishay.com/doc?95046
	TO-262AA	www.vishay.com/doc?95419
Part marking information	D^2PAK (TO-263AB)	www.vishay.com/doc?95444
	TO-262AA	www.vishay.com/doc?95443
Packaging information	D^2PAK (TO-263AB)	www.vishay.com/doc?95032

D²PAK

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES	SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.			MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190		D1	6.86	8.00	0.270	0.315	3
A1	0.00	0.254	0.000	0.010		E	9.65	10.67	0.380	0.420	2, 3
b	0.51	0.99	0.020	0.039		E1	7.90	8.80	0.311	0.346	3
b1	0.51	0.89	0.020	0.035	4	e	2.54 BSC		0.100 BSC		
b2	1.14	1.78	0.045	0.070		H	14.61	15.88	0.575	0.625	
b3	1.14	1.73	0.045	0.068	4	L	1.78	2.79	0.070	0.110	
c	0.38	0.74	0.015	0.029		L1	-	1.65	-	0.066	3
c1	0.38	0.58	0.015	0.023	4	L2	1.27	1.78	0.050	0.070	
c2	1.14	1.65	0.045	0.065		L3	0.25 BSC		0.010 BSC		
D	8.51	9.65	0.335	0.380	2	L4	4.78	5.28	0.188	0.208	

Notes

(1) Dimensioning and tolerancing per ASME Y14.5 M-1994

(2) Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body

(3) Thermal pad contour optional within dimension E, L1, D1 and E1

(4) Dimension b1 and c1 apply to base metal only

(5) Datum A and B to be determined at datum plane H

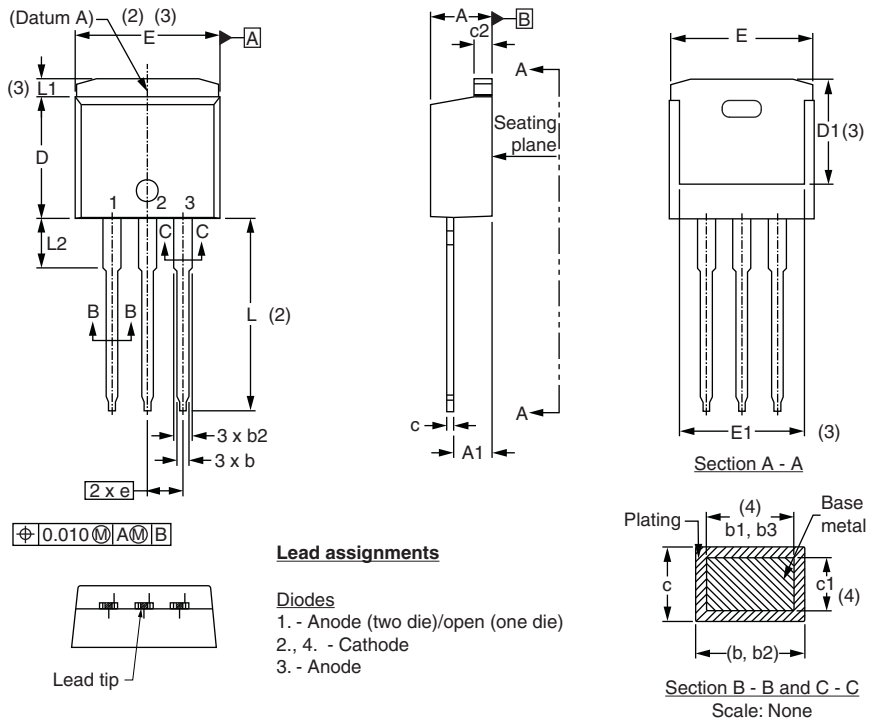
(6) Controlling dimension: inch

(7) Outline conforms to JEDEC® outline TO-263AB

TO-262

DIMENSIONS in millimeters and inches

Modified JEDEC® outline TO-262



Lead assignments

Diodes
1. - Anode (two die)/open (one die)
2., 4. - Cathode
3. - Anode

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	0.160	0.190	
A1	2.03	3.02	0.080	0.119	
b	0.51	0.99	0.020	0.039	
b1	0.51	0.89	0.020	0.035	4
b2	1.14	1.78	0.045	0.070	
b3	1.14	1.73	0.045	0.068	4
c	0.38	0.74	0.015	0.029	
c1	0.38	0.58	0.015	0.023	4
c2	1.14	1.65	0.045	0.065	
D	8.51	9.65	0.335	0.380	2
D1	6.86	8.00	0.270	0.315	3
E	9.65	10.67	0.380	0.420	2, 3
E1	7.90	8.80	0.311	0.346	3
e	2.54 BSC		0.100 BSC		
L	13.46	14.10	0.530	0.555	
L1	-	1.65	-	0.065	3
L2	3.36	3.71	0.132	0.146	

Notes

(1) Dimensioning and tolerancing as per ASME Y14.5M-1994

(2) Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body

(3) Thermal pad contour optional within dimension E, L1, D1 and E1

(4) Dimension b1 and c1 apply to base metal only

(5) Controlling dimension: inches

(6) Outline conform to JEDEC TO-262 except A1 (maximum), b (minimum) , D1 (minimum) and L2 where dimensions derived the actual package outline

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