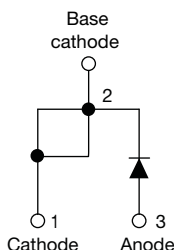


Fast Soft Recovery Rectifier Diode, 40 A



TO-247AC modified



FEATURES

- 150 °C max. operating junction temperature
- Low forward voltage drop and short reverse recovery time
- Designed and qualified according to JEDEC®-JESD47
- Material categorization:
For definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

These devices are intended for use in output rectification and freewheeling in inverters, choppers and converters as well as in input rectification where severe restrictions on conducted EMI should be met.

DESCRIPTION

The VS-40EPF1... fast soft recovery rectifier series has been optimized for combined short reverse recovery time and low forward voltage drop.

The glass passivation ensures stable reliable operation in the most severe temperature and power cycling conditions.

PRODUCT SUMMARY

Package	TO-247AC modified (2 pins)
$I_{F(AV)}$	40 A
V_R	1000 V, 1200 V
V_F at I_F	1.4 V
I_{FSM}	475 A
t_{rr}	95 ns
T_J max.	150 °C
Diode variation	Single die
Snap factor	0.5

MAJOR RATINGS AND CHARACTERISTICS

SYMBOL	CHARACTERISTICS	VALUES	UNITS
V_{RRM}		1000/1200	V
$I_{F(AV)}$	Sinusoidal waveform	40	A
I_{FSM}		475	
t_{rr}	1 A, 100 A/μs	95	ns
V_F	20 A, $T_J = 25$ °C	1.25	V
T_J		-40 to 150	°C

VOLTAGE RATINGS

PART NUMBER	V_{RRM} , MAXIMUM PEAK REVERSE VOLTAGE V	V_{RSM} , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	I_{RRM} AT 150 °C mA
VS-40EPF10PbF, VS-40EPF10-M3	1000	1100	10
VS-40EPF12PbF, VS-40EPF12-M3	1200	1300	

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current	$I_{F(AV)}$	$T_C = 105$ °C, 180° conduction half sine wave	40	A
Maximum peak one cycle non-repetitive surge current	I_{FSM}	10 ms sine pulse, rated V_{RRM} applied	400	
		10 ms sine pulse, no voltage reapplied	475	
Maximum I^2t for fusing	I^2t	10 ms sine pulse, rated V_{RRM} applied	800	A ² s
		10 ms sine pulse, no voltage reapplied	1131	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	$t = 0.1$ ms to 10 ms, no voltage reapplied	11 310	A ² √s

**ELECTRICAL SPECIFICATIONS**

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum forward voltage drop	V_{FM}	40 A, $T_J = 25\text{ }^{\circ}\text{C}$		1.4	V
Forward slope resistance	r_t	$T_J = 150\text{ }^{\circ}\text{C}$		6.82	m Ω
Threshold voltage	$V_{F(TO)}$			0.94	V
Maximum reverse leakage current	I_{RM}	$T_J = 25\text{ }^{\circ}\text{C}$	$V_R = \text{Rated } V_{RRM}$	0.1	mA
		$T_J = 150\text{ }^{\circ}\text{C}$		10	

RECOVERY CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS	
Reverse recovery time	t_{rr}	I_F at 10 A _{pk} 25 A/ μ s 25 $^{\circ}\text{C}$	450	ns	
Reverse recovery current	I_{rr}		6	A	
Reverse recovery charge	Q_{rr}		1.8	μ C	
Snap factor	S		0.5		

THERMAL - MECHANICAL SPECIFICATIONS

PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction and storage temperature range	T _J , T _{Stg}		-40 to 150	°C
Maximum thermal resistance, junction to case	R _{thJC}	DC operation	0.6	°C/W
Maximum thermal resistance, junction to ambient	R _{thJA}		40	
Typical thermal resistance, case to heatsink	R _{thCS}	Mounting surface, smooth and greased	0.2	
Approximate weight			6	g
			0.21	oz.
Mounting torque	minimum		6 (5)	kgf · cm (lbf · in)
	maximum		12 (10)	
Marking device		Case style TO-247AC modified (JEDEC)	40EPF10	
			40EPF12	

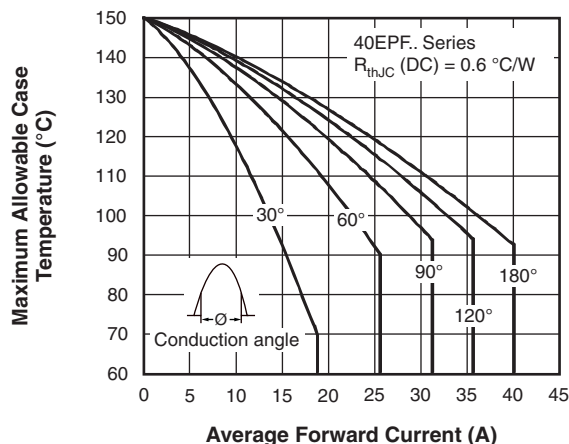


Fig. 1 - Current Rating Characteristics

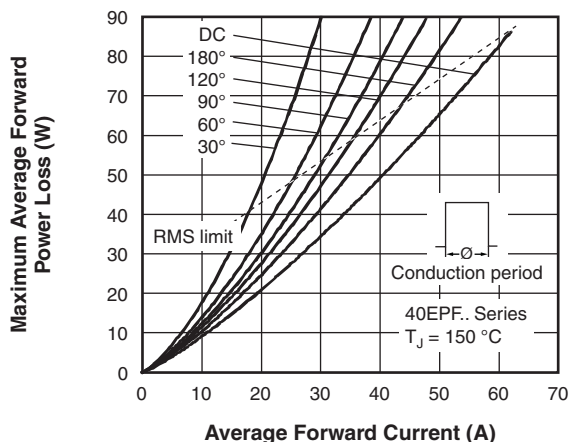


Fig. 4 - Forward Power Loss Characteristics

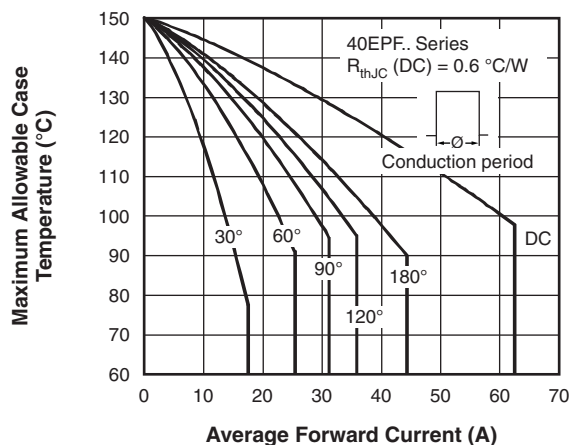


Fig. 2 - Current Rating Characteristics

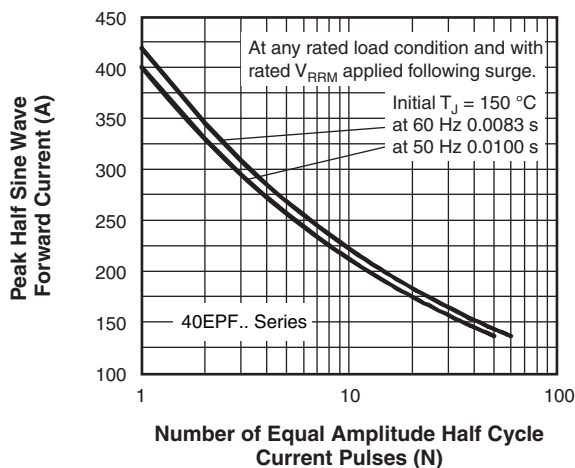


Fig. 5 - Maximum Non-Repetitive Surge Current

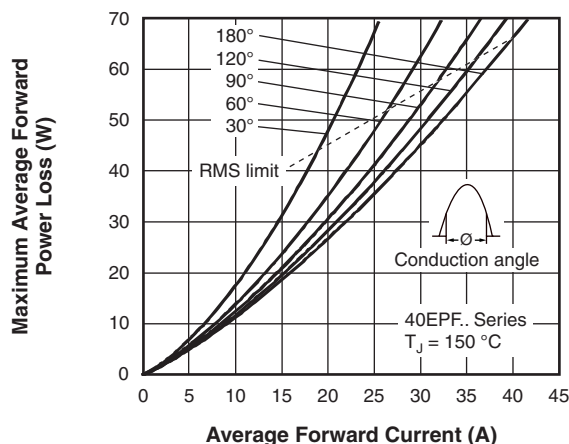


Fig. 3 - Forward Power Loss Characteristics

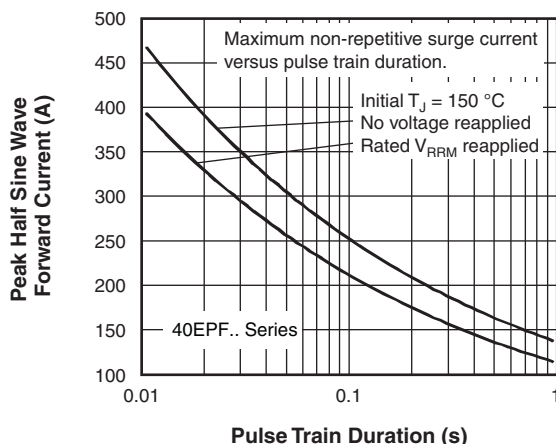


Fig. 6 - Maximum Non-Repetitive Surge Current

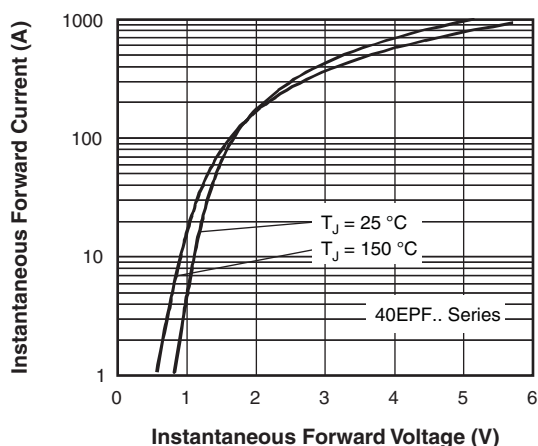


Fig. 7 - Forward Voltage Drop Characteristics

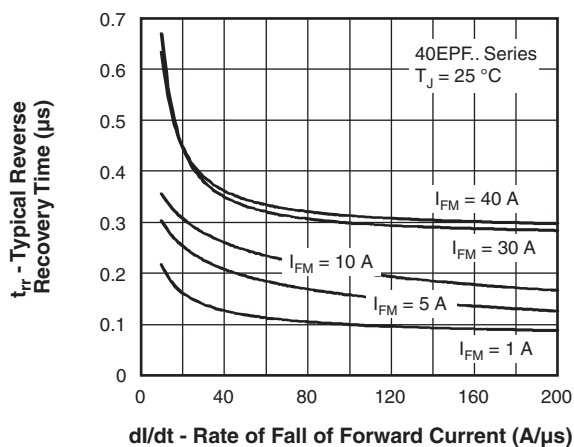


Fig. 8 - Recovery Time Characteristics, $T_J = 25\text{ °C}$

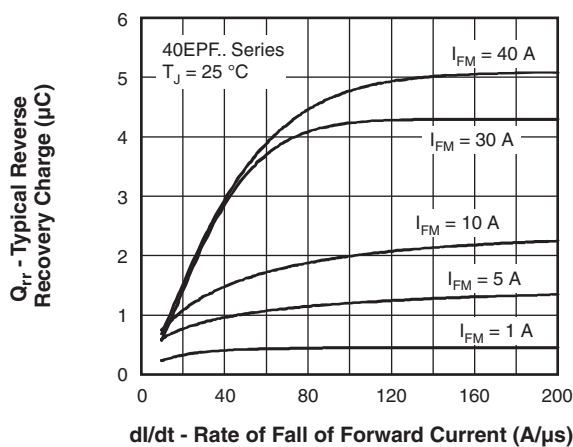


Fig. 10 - Recovery Charge Characteristics, $T_J = 25\text{ °C}$

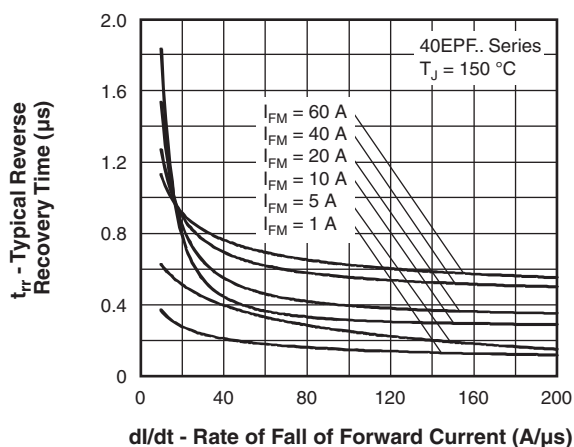


Fig. 9 - Recovery Time Characteristics, $T_J = 150\text{ °C}$

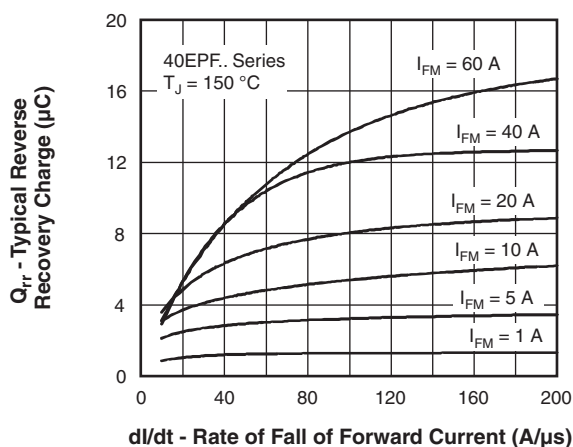


Fig. 11 - Recovery Charge Characteristics, $T_J = 150\text{ °C}$

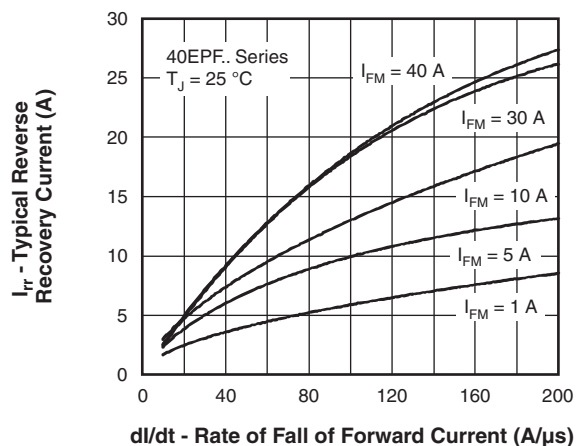


Fig. 12 - Recovery Current Characteristics, $T_J = 25^\circ C$

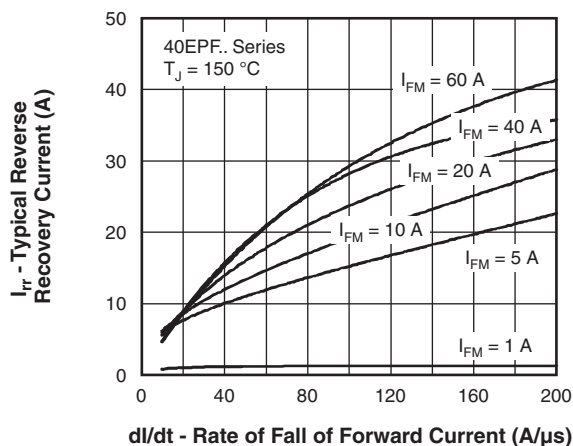


Fig. 13 - Recovery Current Characteristics, $T_J = 150^\circ C$

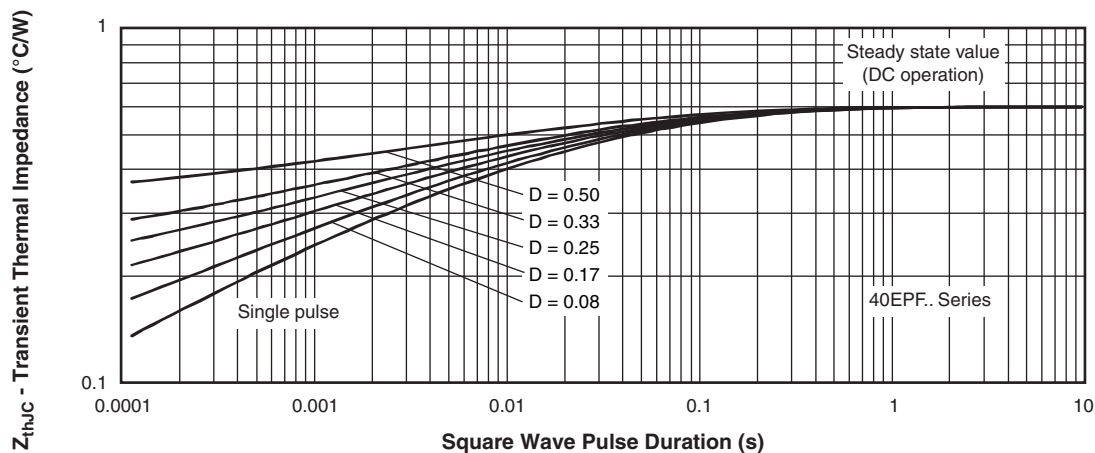


Fig. 14 - Thermal Impedance Z_{thJC} Characteristics

ORDERING INFORMATION TABLE

Device code	VS-	40	E	P	F	12	PbF
	1	2	3	4	5	6	7

- 1** - Vishay Semiconductors product
- 2** - Current rating (40 = 40 A)
- 3** - Circuit configuration:
E = Single diode
- 4** - Package:
P = TO-247AC modified
- 5** - Type of silicon:
F = Fast recovery
- 6** - Voltage code x 100 = V_{RRM}

10 = 1000 V
12 = 1200 V
- 7** - Environmental digit:
 - PbF = Lead (Pb)-free and RoHS compliant
 - -M3 = Halogen-free, RoHS compliant and terminations lead-free

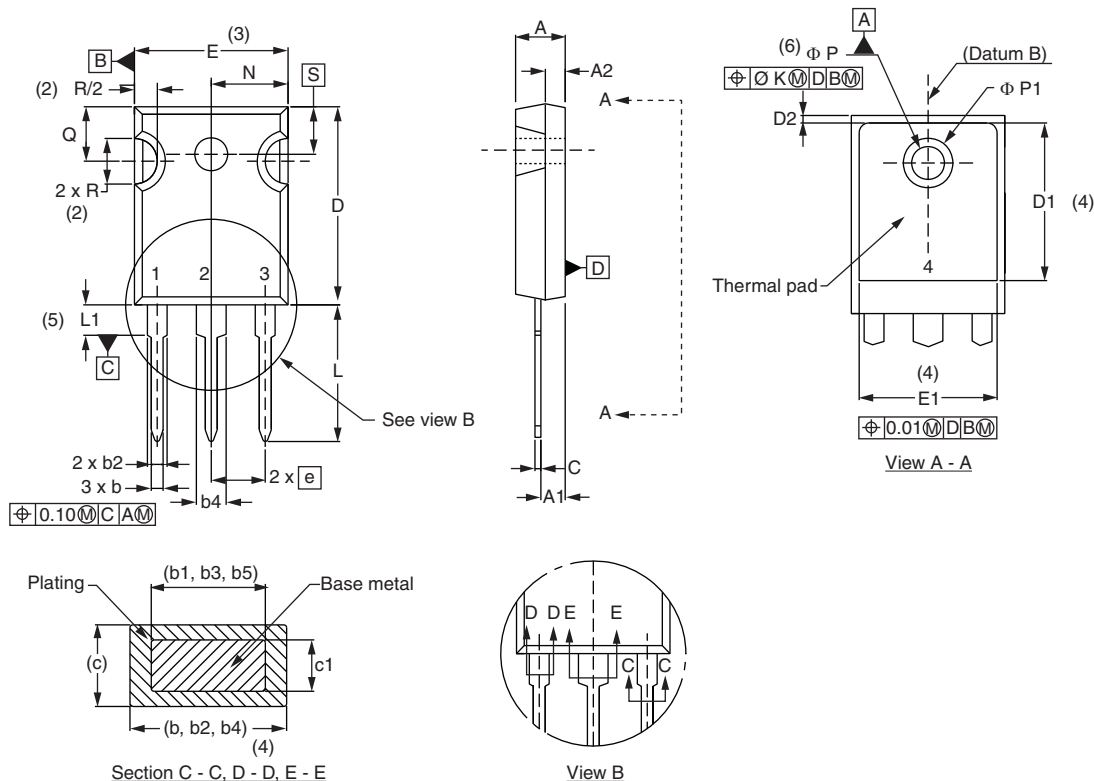
ORDERING INFORMATION (Example)			
PREFERRED P/N	QUANTITY PER T/R	MINIMUM ORDER QUANTITY	PACKAGING DESCRIPTION
VS-40EPF10PbF	25	500	Antistatic plastic tubes
VS-40EPF10-M3	25	500	Antistatic plastic tubes
VS-40EPF12PbF	25	500	Antistatic plastic tubes
VS-40EPF12-M3	25	500	Antistatic plastic tubes

LINKS TO RELATED DOCUMENTS		
Dimensions		www.vishay.com/doc?95541
Part marking information	TO-247AC modified PbF	www.vishay.com/doc?95255
	TO-247AC modified -M3	www.vishay.com/doc?95442



TO-247

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.65	5.31	0.183	0.209	
A1	2.21	2.59	0.087	0.102	
A2	1.50	2.49	0.059	0.098	
b	0.99	1.40	0.039	0.055	
b1	0.99	1.35	0.039	0.053	
b2	1.65	2.39	0.065	0.094	
b3	1.65	2.34	0.065	0.092	
b4	2.59	3.43	0.102	0.135	
b5	2.59	3.38	0.102	0.133	
c	0.38	0.89	0.015	0.035	
c1	0.38	0.84	0.015	0.033	
D	19.71	20.70	0.776	0.815	3
D1	13.08	-	0.515	-	4

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
D2	0.51	1.30	0.020	0.051	
E	15.29	15.87	0.602	0.625	3
E1	13.72	-	0.540	-	
e	5.46 BSC		0.215 BSC		
ΦK	2.54		0.010		
L	14.20	16.10	0.559	0.634	
L1	3.71	4.29	0.146	0.169	
N	7.62 BSC		0.3		
ΦP	3.56	3.66	0.14	0.144	
$\Phi P1$	-	6.98	-	0.275	
Q	5.31	5.69	0.209	0.224	
R	4.52	5.49	0.178	0.216	
S	5.51 BSC		0.217 BSC		

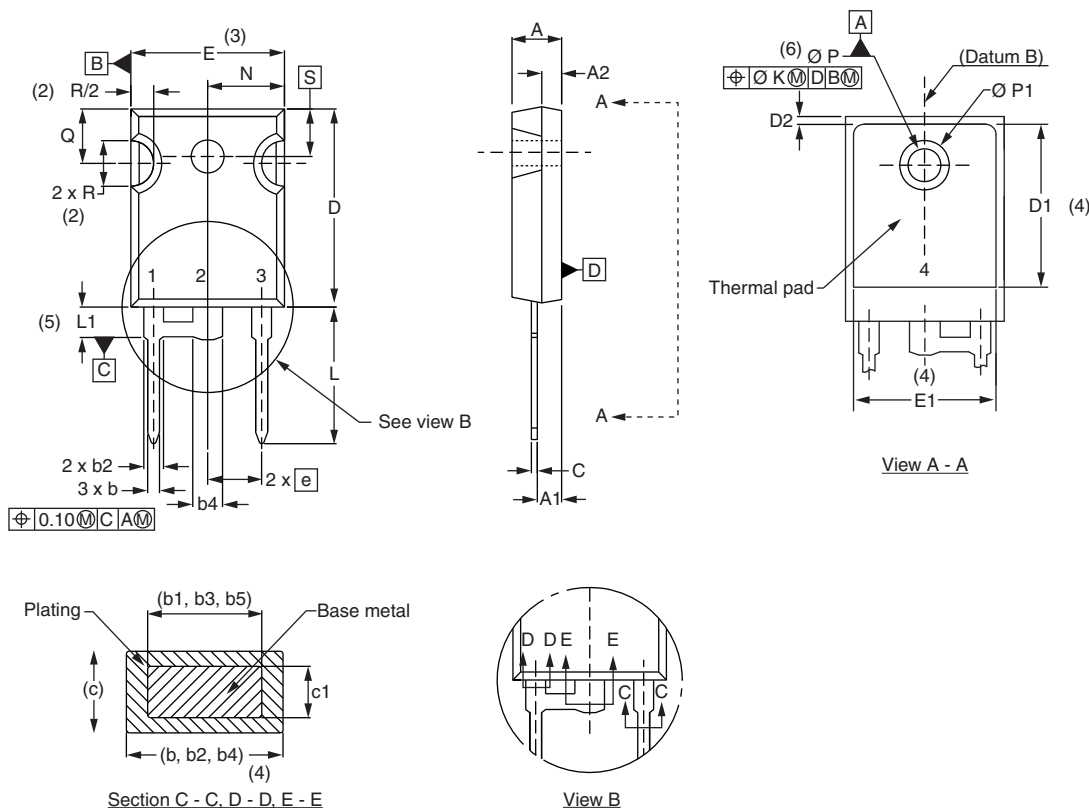
Notes

- (1) Dimensioning and tolerancing per ASME Y14.5M-1994
- (2) Contour of slot optional
- (3) 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 outermost extremes of the plastic body
- (4) Thermal pad contour optional with dimensions D1 and E1
- (5) Lead finish uncontrolled in L1
- (6) ΦP to have a maximum draft angle of 1.5 to the top of the part with a maximum hole diameter of 3.91 mm (0.154")
- (7) Outline conforms to JEDEC® outline TO-247 with exception of dimension c



TO-247 - 50 mils L/F modified

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.65	5.31	0.183	0.209	
A1	2.21	2.59	0.087	0.102	
A2	1.17	1.37	0.046	0.054	
b	0.99	1.40	0.039	0.055	
b1	0.99	1.35	0.039	0.053	
b2	1.65	2.39	0.065	0.094	
b3	1.65	2.34	0.065	0.092	
b4	2.59	3.43	0.102	0.135	
b5	2.59	3.38	0.102	0.133	
c	0.38	0.89	0.015	0.035	
c1	0.38	0.84	0.015	0.033	
D	19.71	20.70	0.776	0.815	3
D1	13.08	-	0.515	-	4

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
D2	0.51	1.35	0.020	0.053	
E	15.29	15.87	0.602	0.625	3
E1	13.46	-	0.53	-	
e	5.46 BSC		0.215 BSC		
Ø K	0.254		0.010		
L	14.20	16.10	0.559	0.634	
L1	3.71	4.29	0.146	0.169	
N	7.62 BSC		0.3		
Ø P	3.56	3.66	0.14	0.144	
Ø P1	-	7.39	-	0.291	
Q	5.31	5.69	0.209	0.224	
R	4.52	5.49	0.178	0.216	
S	5.51 BSC		0.217 BSC		

Notes

- Dimensioning and tolerance per ASME Y14.5M-1994
- Contour of slot optional
- 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 outermost extremes of the plastic body
- Thermal pad contour optional with dimensions D1 and E1
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- Ø P to have a maximum draft angle of 1.5 to the top of the part with a maximum hole diameter of 3.91 mm (0.154")
- Outline conforms to JEDEC® outline TO-247 with exception of dimension c and Q



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