

STANDARD & SENSITIVE 12A SCR

<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>TO-252AA (DPAK) (FS12xxxD)</p> <p>(FULLY ISOLATED CASE)</p> <p>TO-220F (FS12xxxW)</p> <p>TO-220AB (FS12xxxH)</p> </div> <div style="text-align: center;"> <p>TO-263AB (D2PAK) (FS12xxxG)</p> <p>TO-251AA (IPAK) (FS12xxxI)</p> </div> </div> <div style="text-align: center; margin-top: 20px;"> </div>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">On-State Current 12 Amp</td> <td style="width: 50%;">Gate Trigger Current 200 μA to 25mA</td> </tr> <tr> <td colspan="2" style="text-align: center;">Off-State Voltage 400 V \div 800 V</td> </tr> </table> <p>FEATURES</p> <ul style="list-style-type: none"> • Glass/passivated die junctions • Low current SCR • Low thermal resistance • High surge current capability • Low forward voltage drop • Solder dip 260°C, 10s • Component in accordance to RoHS 2011/65/EU and WEEE 2002/96/EC • Meets MSL level 3, per J-STD-020, LF maximum peak of 260°C <div style="text-align: right;"> <p>RoHS COMPLIANT</p> </div> <p>MECHANICAL DATA</p> <ul style="list-style-type: none"> • Case: (DPAK) / (D2PAK) / (IPAK) / (TO-220F) / (TO-220AB). Epoxy meets UL 94V-0 flammability rating. • Polarity: As marked on the body. • Terminals: Matte tin plated leads, solderable per MIL-STD-750 Method 2026, J-STD-002 and JESD22-B102. Consumer grade, meets JESD 201 class 1A whisker test. <p>TYPICAL APPLICATIONS</p> <p>The standard gate SCR FS1208, FS1209 and FS1210 series is suitable for a wide range of applications, e.g., Overvoltage Crowbar protection, Motor Control circuits in Power Tools and domestic appliances, inrush current limiting circuits, capacitive discharge ignition and voltage regulation circuits.</p> <p>The sensitive gate SCR FS1202 series is suitable for applications where the available gate current is limited, e.g., Ground Fault Interruptors, Solid State Relays, Stand-by mode power supplies, smoke and alarm detectors.</p>	On-State Current 12 Amp	Gate Trigger Current 200 μ A to 25mA	Off-State Voltage 400 V \div 800 V	
On-State Current 12 Amp	Gate Trigger Current 200 μ A to 25mA				
Off-State Voltage 400 V \div 800 V					

Maximum Ratings and Electrical Characteristics at 25°C

SYMBOL	PARAMETER	CONDITIONS	Value	Unit
$I_{T(RMS)}$	On-state Current	180° Conduction Angle, TO-220F $T_C = 70^\circ C$ DPAK/D2PAK/IPAK/TO-220AB $T_C = 105^\circ C$	12	A
$I_{T(AV)}$	Average On-state Current	180° Conduction Angle, TO-220F $T_C = 70^\circ C$ DPAK/D2PAK/IPAK/TO-220AB $T_C = 105^\circ C$	8	A
I_{TSM}	Non-repetitive On-State Current	Half Cycle, 60 Hz	145	A
I_{TSM}	Non-repetitive On-State Current	Half Cycle, 50 Hz	140	A
I^2t	Fusing Current	$t_p = 10$ ms, Half Cycle	98	A ² s
I_{GM}	Peak Gate Current	20 μ s max.	4	A
P_{GM}	Peak Gate Dissipation	20 μ s max.	10	W
$P_{G(AV)}$	Gate Dissipation	20ms max.	1	W
T_j	Operating Temperature		(-40 to +125)	°C
T_{stg}	Storage Temperature		(-40 to +150)	°C
T_{sld}	Soldering Temperature	10s max.	260	°C
V_{RGM}	Max. Peak Reverse Gate Voltage (For FS1208, FS1209 and FS1210 only)		5	V
V_{iso}	R.M.S. isolation voltage 50/60 Hz sinusoidal waveform		2500	Vac

SYMBOL	PARAMETER	VOLTAGE			Unit
		D	M	N	
V_{DRM} V_{RRM}	Repetitive Peak Off State Voltage	400	600	800	V

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Electrical Characteristics at Tamb = 25 °C

SYMBOL	PARAMETER	CONDITIONS	SG	STANDARD				Unit	
				02	08	09	10		
I _{GT}	Gate Trigger Current	V _D = 12 V _{DC}	R _L = 140Ω	MAX	200	-	-	-	μA
			R _L = 33Ω	MIN	-	0.5	2	2	mA
				MAX	-	5	15	25	mA
V _{GT}	Gate Trigger Voltage	V _D = 12 V _{DC}	R _L = 140Ω R _L = 33Ω	MAX	0.8 -	-		V	
V _{GD}	Gate Non Trigger Voltage	V _D = V _{DRM} , T _j = 125°C, R _L = 3.3kΩ	R _{GK} = 220Ω Gate open	MIN	0.1 -	-		V	
V _{RGM}	Reverse Gate Voltage	I _{R,G} = 10μA,		MIN	8	-		V	
I _H	Holding Current	I _T = 500 mA,	R _{GK} = 1kΩ Gate open	MAX	5	-	-	-	mA
					-	15	30	40	
I _L	Latching Current	I _G = 1.2 I _{GT}	R _{GK} = 1kΩ Gate open	MAX	6	-	-	-	mA
					-	30	60	60	
dV / dt	Critical Rate of Voltage Rise	V _D = 0.67 V _{DRM} , T _j = 125 °C	R _{GK} = 220Ω Gate open	MIN	5 -	- 40	- 200	- 400	V/μs
dI / dt	Critical Rate of Current Rise	I _G = 2 x I _{GT} , tr ≤ 100 ns, f = 60 Hz, T _j = 125 °C		MIN	50			A/μs	
V _{TM}	On-state Voltage	at I _T = 24 Amp, tp = 380 μs, T _j = 25 °C		MAX	1.6			V	
V _{t(0)}	Threshold Voltage	T _j = 125 °C		MAX	0.85			V	
r _d	Dynamic resistance	T _j = 125 °C		MAX	30			mΩ	
I _{DRM} / I _{RRM}	Off-State Leakage Current	V _{DRM} = V _{RRM} , R _{GK} = 220Ω	T _j = 125 °C T _j = 25 °C	MAX	1	2		mA	
					5	5		μA	

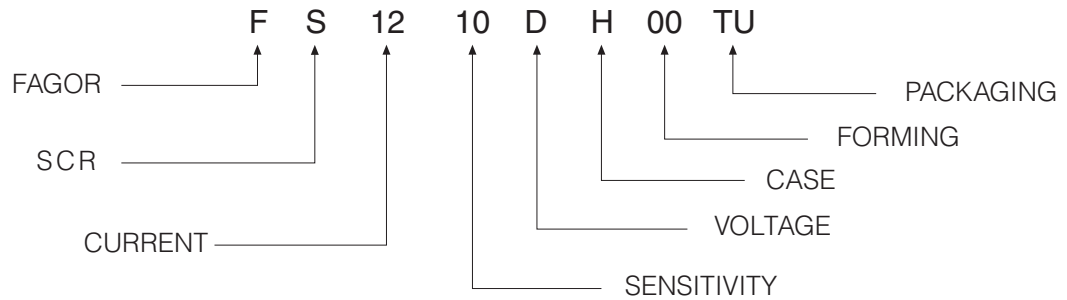
Thermal resistance

SYMBOL	PARAMETER	CONDITIONS	Value	Unit
R _{th(j-c)}	Thermal Resistance Junction-Case for DC	DPAK, IPAK, D2PAK, TO-220AB	1.3	°C/W
		TO-220F	4.6	
R _{th(j-a)}	Thermal Resistance Junction-Amb for DC	S = 0.5cm ²	70	°C/W
		S = 1cm ²	45	
		IPAK	100	
		TO-220F	60	
		TO-220AB	60	

S = Copper surface under tab

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Part Number Information



Ordering information

PREFERRED P/N	PACKAGE CODE	DELIVERY MODE	BASE QUANTITY	UNIT WEIGHT (g)
FS1209DD 00TR	TR	13" diameter tape and reel	2500	0.30

PREFERRED P/N	PACKAGE CODE	DELIVERY MODE	BASE QUANTITY	UNIT WEIGHT (g)
FS1209DG 00TR	TR	13" diameter tape and reel	800	1.50

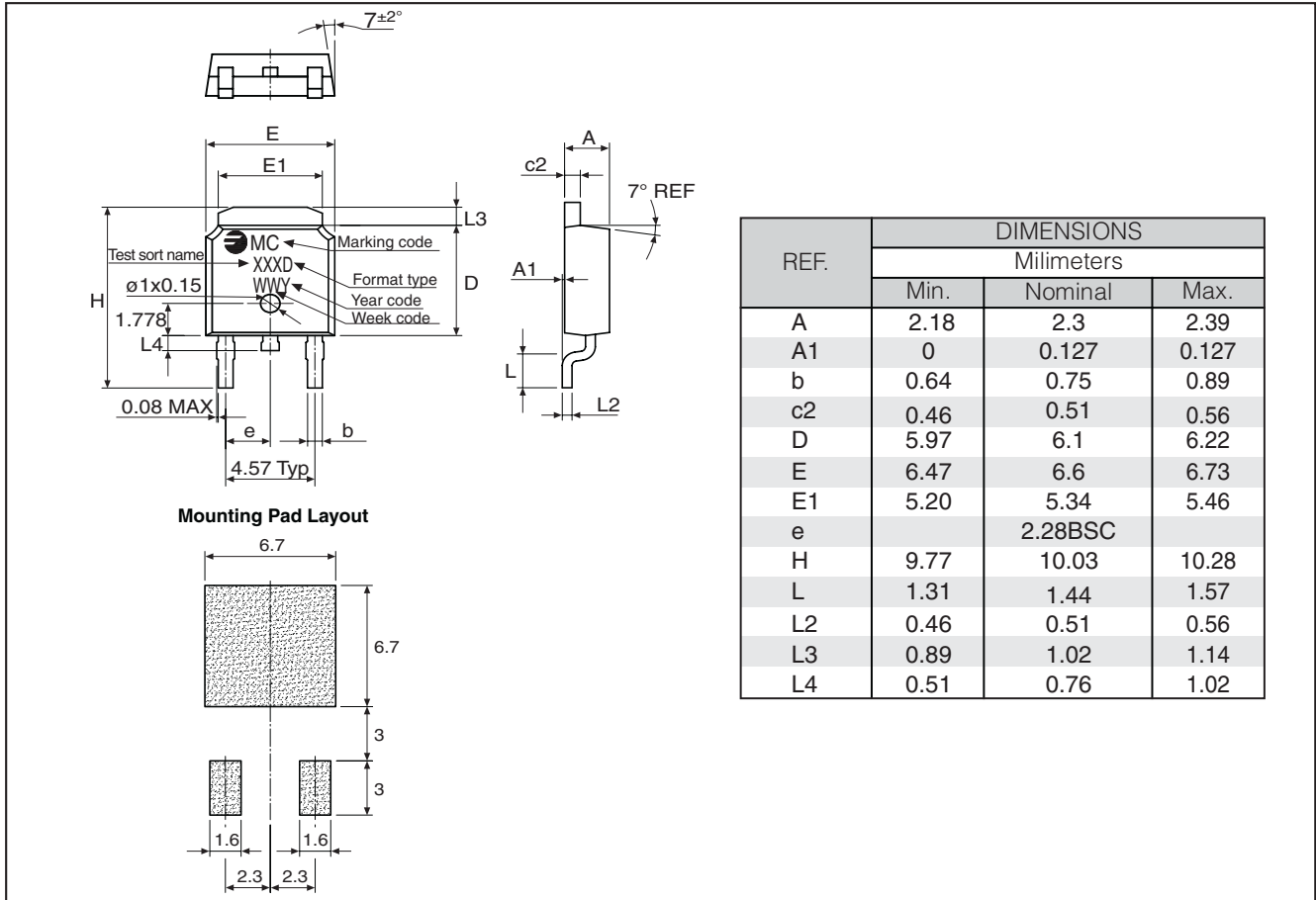
PREFERRED P/N	PACKAGE CODE	DELIVERY MODE	BASE QUANTITY	UNIT WEIGHT (g)
FS1209DW 00TU	TU	TUBE	1000	2.00

PREFERRED P/N	PACKAGE CODE	DELIVERY MODE	BASE QUANTITY	UNIT WEIGHT (g)
FS1209DI 00TU	TU	TUBE	4000	0.40

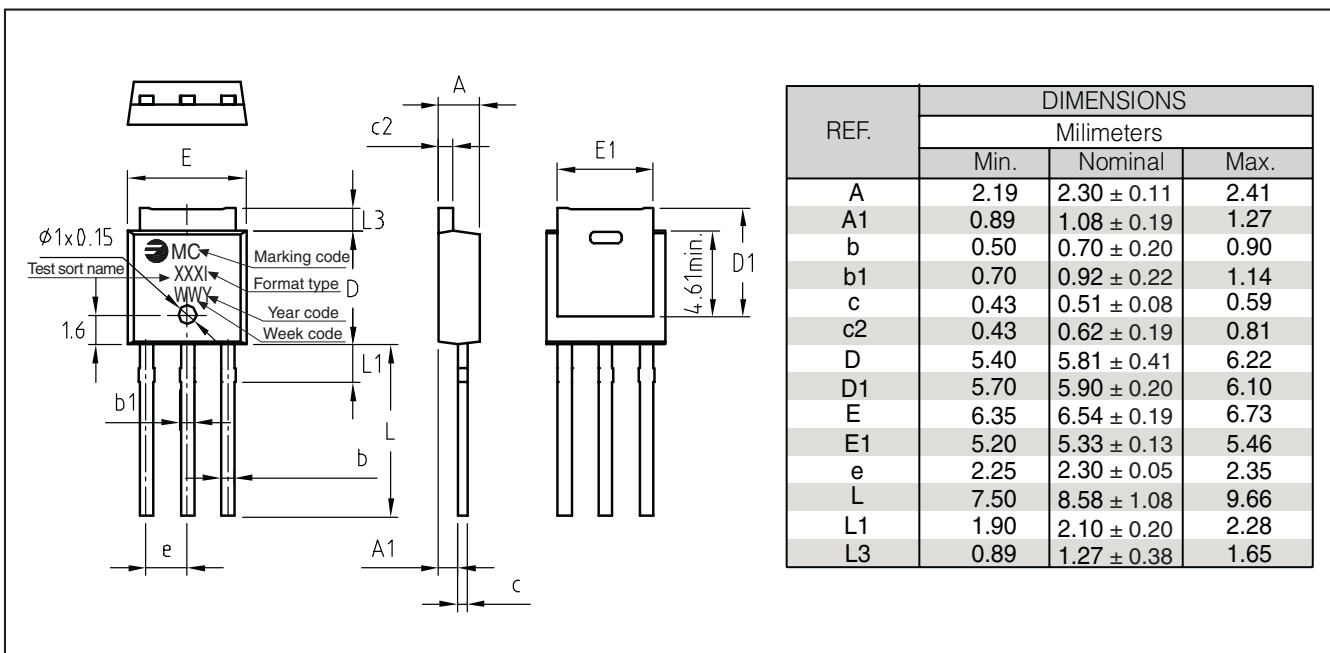
PREFERRED P/N	PACKAGE CODE	DELIVERY MODE	BASE QUANTITY	UNIT WEIGHT (g)
FS1209DH 00TU	TU	TUBE	1000	2.30

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Package Outline Dimensions: (mm) TO-252AA (DPAK)

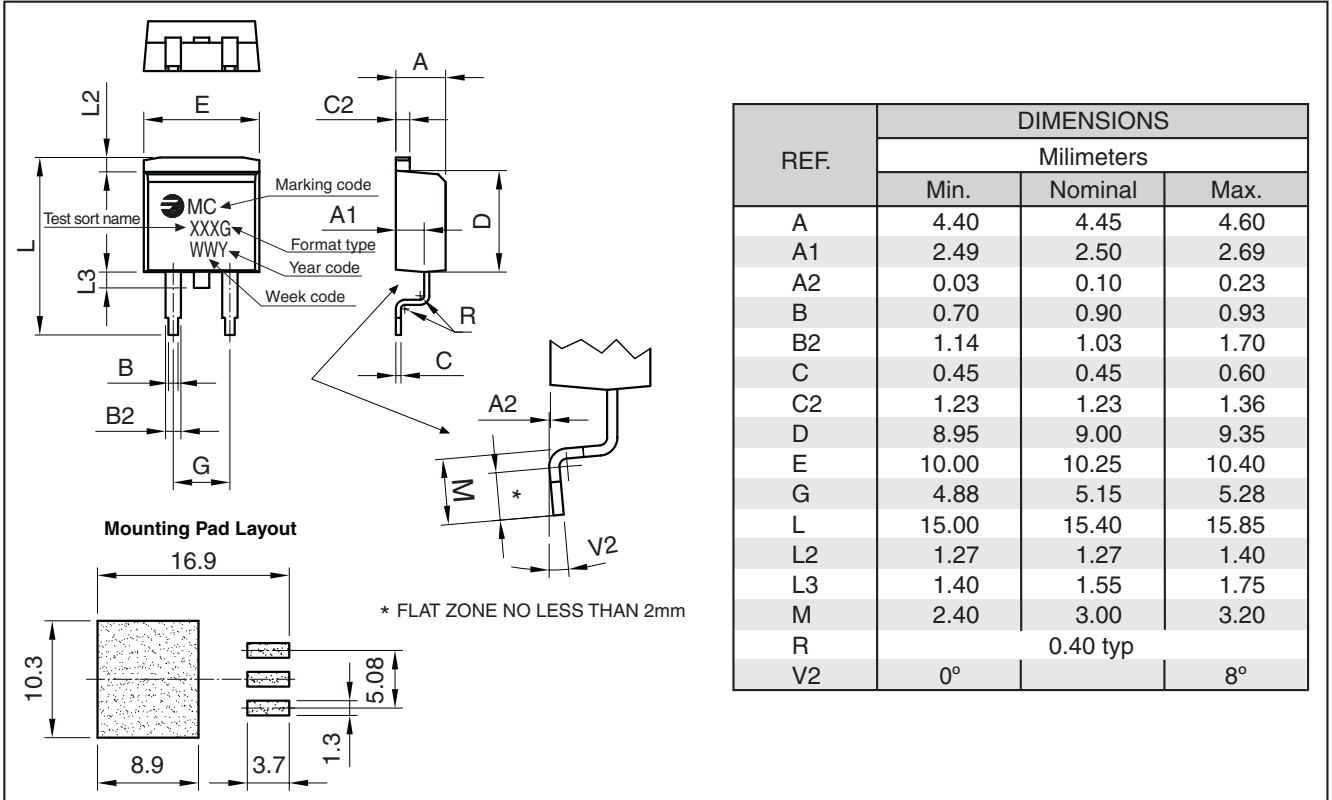


Package Outline Dimensions: (mm) TO-251AA (IPAK)

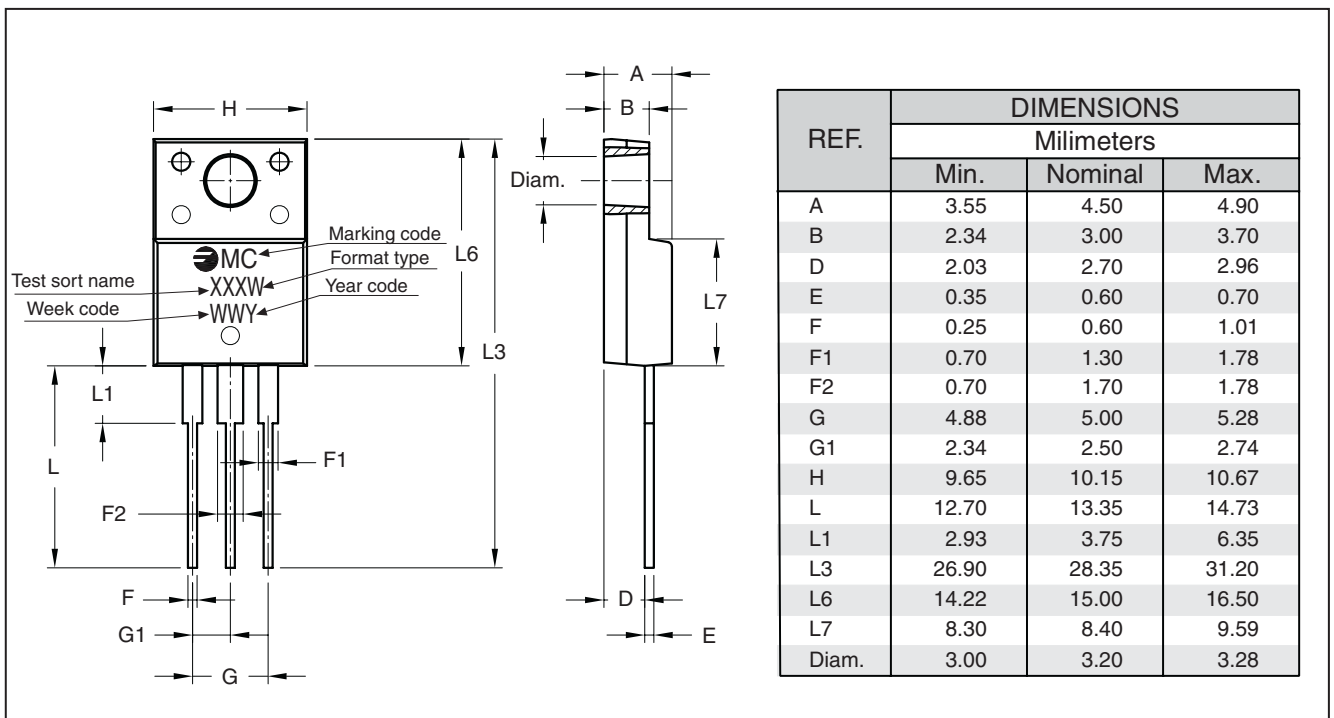


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Package Outline Dimensions: (mm) TO-263AB (D2PAK)

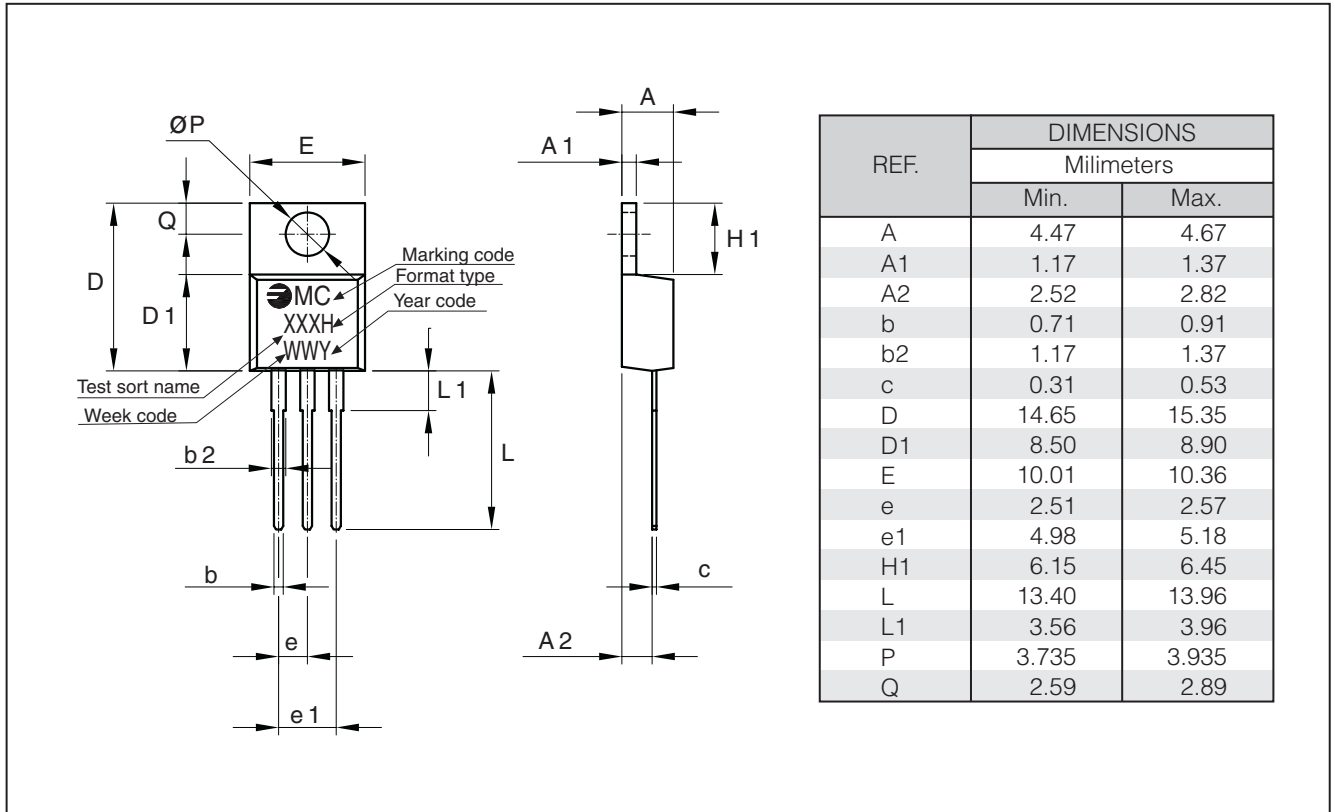


Package Outline Dimensions: (mm) TO-220F



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Package Outline Dimensions: (mm) TO-220AB



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Ratings and Characteristics (Ta 25 °C unless otherwise noted)

Fig. 1: Maximum average power dissipation versus average on-state current.

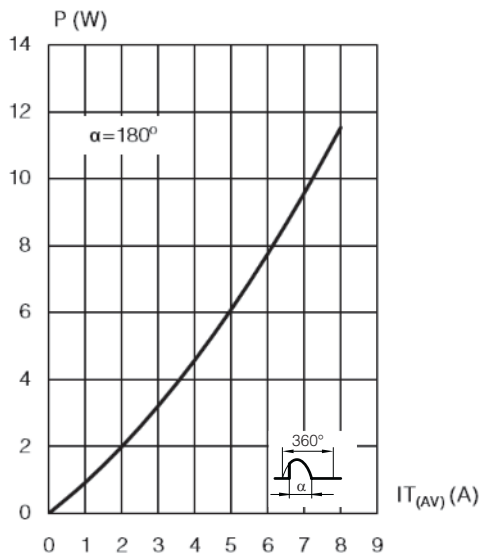


Fig. 2: Average and D.C. on-state current versus case temperature.

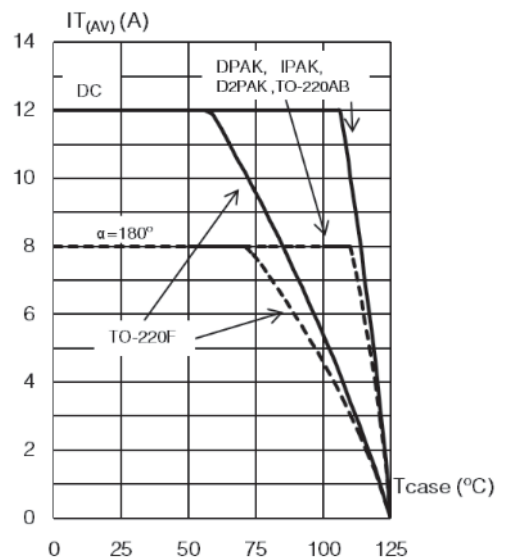


Fig. 3: Relative variation of thermal impedance junction to case versus pulse duration.

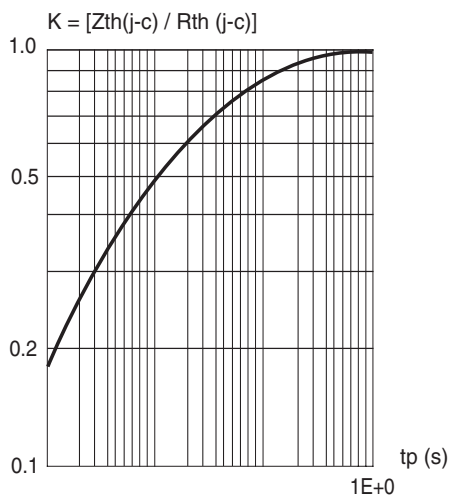
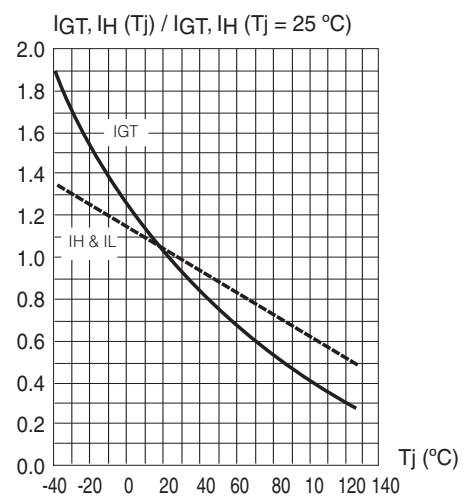


Fig. 4: Relative variation of gate trigger current, holding and latching current versus junction temperature for Sensitive Gate SCR (O2).



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Ratings and Characteristics (Ta 25 °C unless otherwise noted)

Fig. 5: Relative variation of gate trigger current, holding and latching current versus junction temperature for Standard Gate SCRs (08,09,10).

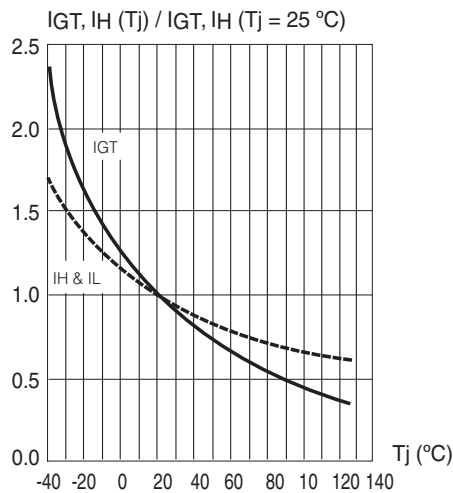


Fig. 6: Non repetitive surge peak on-state current versus number of cycles.

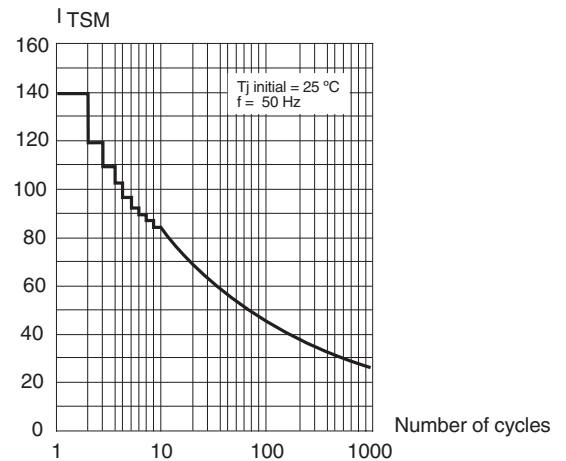


Fig. 7: Non repetitive surge peak on-state current for a sinusoidal pulse with width: tp < 10 ms, and corresponding value of I²t.

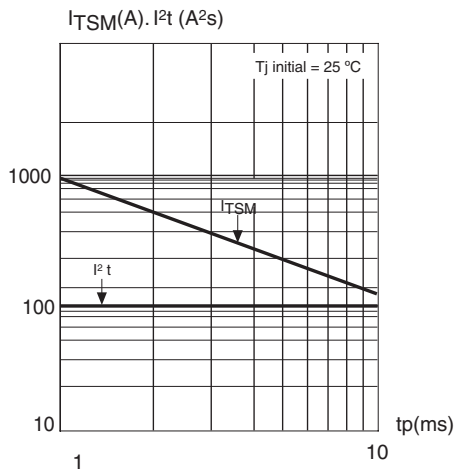
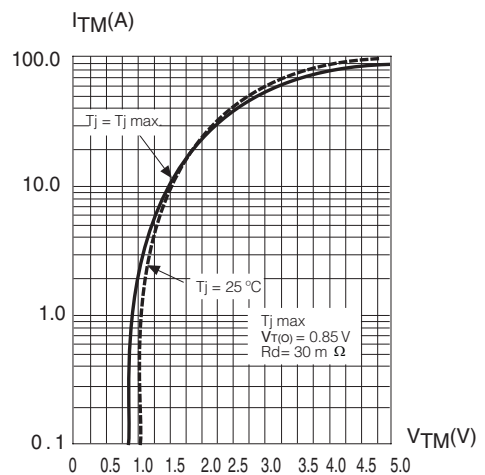


Fig. 8: On-state characteristics (maximum values).



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Revision History

Date	Revision	Description of Changes
14-Oct-2014	0	Original Data Sheet
16-Dec-2014	1	Modified Typical Applications Description and Title

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