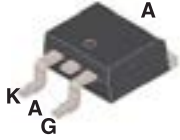
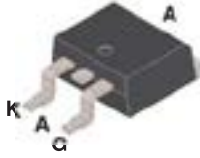



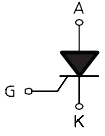




**STANDARD & SENSITIVE 12A SCR**

<div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"> <p><b>TO-252AA (DPAK) (FS12xxxD)</b></p>  <p>(FULLY ISOLATED CASE)</p> </div> <div style="width: 50%;"> <p><b>TO-263AB (D2PAK) (FS12xxxG)</b></p>  </div> <div style="width: 50%;"> <p><b>TO-220F (FS12xxxW)</b></p>  </div> <div style="width: 50%;"> <p><b>TO-251AA (IPAK) (FS12xxxI)</b></p>  </div> <div style="width: 50%;"> <p><b>TO-220AB (FS12xxxH)</b></p>  </div> </div> <div style="text-align: center; margin-top: 10px;">  </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;"><b>On-State Current</b></td> <td style="text-align: center;"><b>Gate Trigger Current</b></td> </tr> <tr> <td style="text-align: center;">12 Amp</td> <td style="text-align: center;">200 <math>\mu</math>A to 25 mA</td> </tr> <tr> <td colspan="2" style="text-align: center;"><b>Off-Satate Voltage</b></td> </tr> <tr> <td colspan="2" style="text-align: center;">400 V <math>\div</math> 800 V</td> </tr> </table> <p><b>FEATURES</b></p> <ul style="list-style-type: none"> <li>• Glass/passivated die junctions</li> <li>• Low current SCR</li> <li>• Low thermal resistance</li> <li>• High surge current capability</li> <li>• Low forward voltage drop</li> <li>• Solder dip 260 °C, 10s</li> <li>• Component in accordance to RoHS 2011/65/EU and WEEE 2002/96/EC</li> <li>• Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C</li> </ul> <div style="text-align: right;">   <p><b>RoHS</b> COMPLIANT</p> </div> <p><b>MECHANICAL DATA</b></p> <ul style="list-style-type: none"> <li>• <b>Case:</b> (DPAK)/ (D2PAK)/ (IPAK)/ (TO-220F)/ (TO-220AB). Epoxy meets UL 94V-0 flammability rating.</li> <li>• <b>Polarity:</b> As marked on the body.</li> <li>• <b>Terminals:</b> 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.</li> </ul> <p><b>TYPICAL APPLICATIONS</b></p> <p>The <b>standard</b> 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. The <b>sensitive</b> 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>	<b>On-State Current</b>	<b>Gate Trigger Current</b>	12 Amp	200 $\mu$ A to 25 mA	<b>Off-Satate Voltage</b>		400 V $\div$ 800 V	
<b>On-State Current</b>	<b>Gate Trigger Current</b>								
12 Amp	200 $\mu$ A to 25 mA								
<b>Off-Satate Voltage</b>									
400 V $\div$ 800 V									

### Maximun Ratings and Electrical Characteristics at 25 °C

SYMBOL	PARAMETER	CONDITIONS	Value	Unit
$I_{T(RMS)}$	On-State Current	180 ° Conduction Angel (Note 1)	12	A
$I_{T(AV)}$	Average On-State Current	180 ° Conduction Angel (Note 1)	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	tp = 10 ms, Half Cycle	98	A <sup>2</sup> s
$I_{GM}$	Peak Gate Current	20 $\mu$ s max. (Note 1)	4	A
$P_{GM}$	Peak Gate Dissipation	20 $\mu$ s max. (Note 1)	10	W
$P_{G(AV)}$	Gate Dissipation	20 ms max.	0.1	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
$T_{iso}$	R.M.S. isolation voltage 50/60 Hz sinusoidal waveform		2500	Vac

**Note 1:** TO-220  $T_c = 70\text{ °C}$   
DPAK/D2PAK/IPAK/TO-220AB  $T_c = 105\text{ °C}$

**STANDARD & SENSITIVE 12A SCR**

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

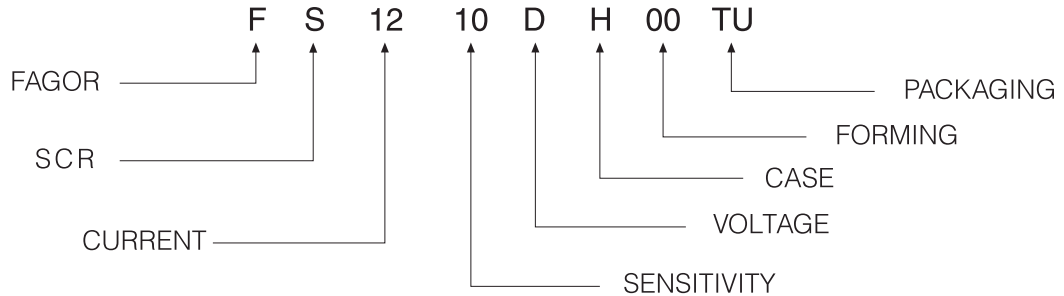
**Electrical Characteristics at Tamb = 25 °C**

SYMBOL	PARAMETER	CONDITIONS	SG 02	STANDARD			Unit	
				08	09	10		
$I_{GT}$	Gate Trigger Current	$V_D = 12 V_{DC}$ $R_L = 140\Omega$	MAX	200	-	-	-	$\mu A$
			MIN	-	0.5	2	2	mA
$V_{GT}$	Gate Trigger Voltage	$V_D = 12 V_{DC}$ $R_L = 140\Omega$	MAX	0.8	-			V
			MIN	-	1.3			
$V_{GD}$	Gate Non Trigger Voltage	$V_D = V_{DRM}, T_j = 125^\circ C, R_L = 3.3k\Omega$ $R_{GK} = 220\Omega$ Gate open	MIN	0.1	-			V
$V_{RGM}$	Reverse Gate Voltage	$I_{RG} = 10\mu A$	MIN	8	-			V
$I_H$	Holding Current	$I_T = 500 mA$ $R_{GK} = 1k\Omega$ Gate open	MAX	5	-	-	-	mA
			MIN	-	15	30	40	
$I_L$	Latching Current	$I_G = 1.2 I_{GT}$ $R_{GK} = 1k\Omega$ Gate open	MAX	6	-	-	-	mA
			MIN	-	30	60	60	
$dV / dt$	Critical Rate of Voltage Rise	$V_D = 0.67 V_{DRM}, T_j = 125^\circ C$ $R_{GK} = 1k\Omega$ Gate open	MIN	5	-	-	-	$V/\mu s$
$dl / dt$	Critical Rate of Current Rise	$I_G = 2 \times I_{GT}, tr \leq 100 ns, f = 60 Hz, T_j = 125^\circ C$	MIN	50			$A/\mu s$	
$V_{TM}$	On-state Voltage	at $I_T = 24 Amp, tp = 380 \mu s, T_j = 25^\circ C$	MAX	1.6			V	
$V_{t(o)}$	Threshold Voltage	$T_j = 125^\circ C$	MAX	0.85			V	
$r_d$	Dynamic resistance	$T_j = 125^\circ C$	MAX	30			$m\Omega$	
$I_{DRM} / I_{RRM}$	Off-State Leakage Current	$V_{DRM} = V_{RRM}, R_{GK} = 220\Omega$ $T_j = 125^\circ C$	MAX	1	2		mA	
			MAX	5	5			$\mu A$

**Thermal resistance**

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

S = Copper surface under tab

**Part Number Information**

**Ordering information**

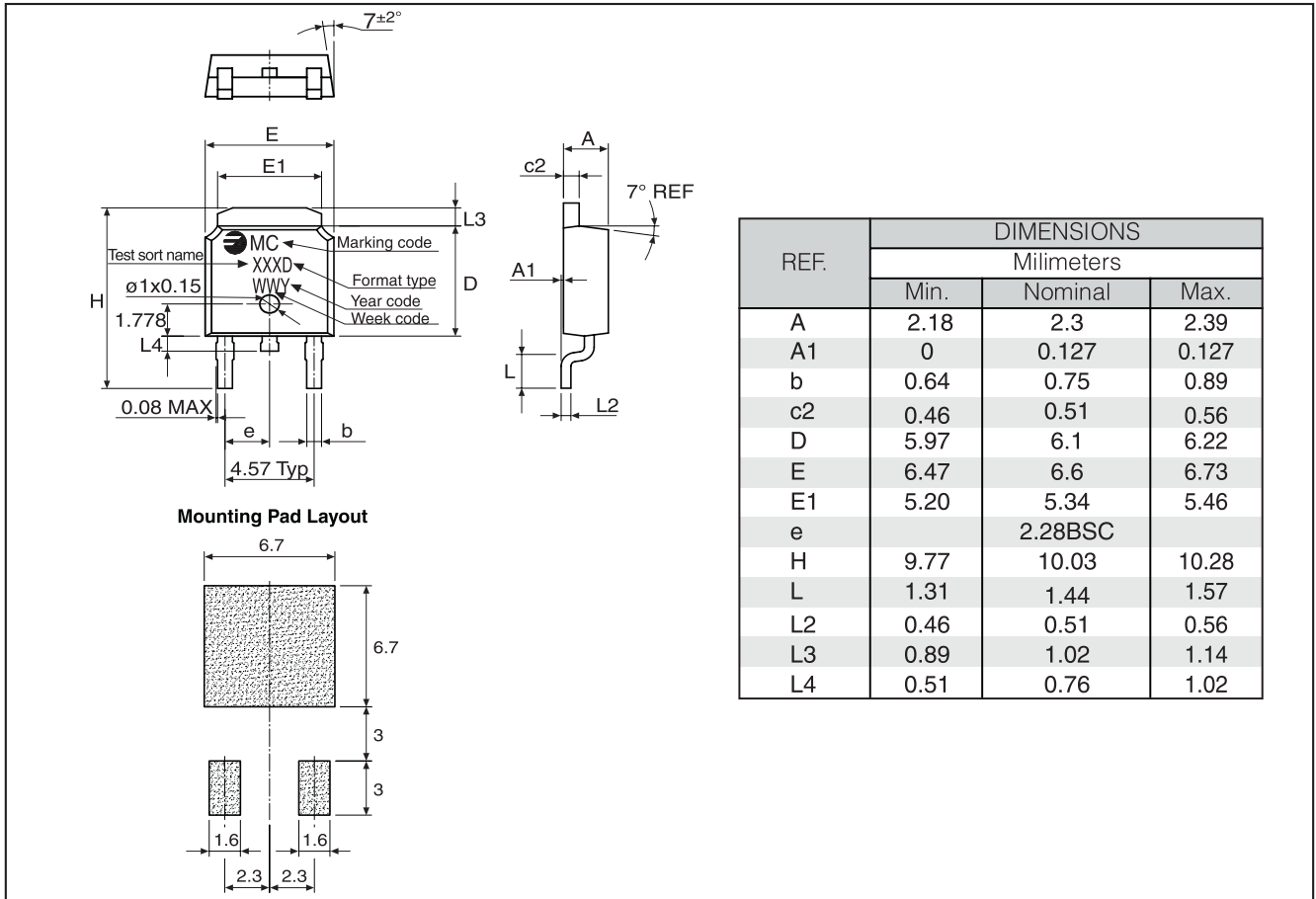
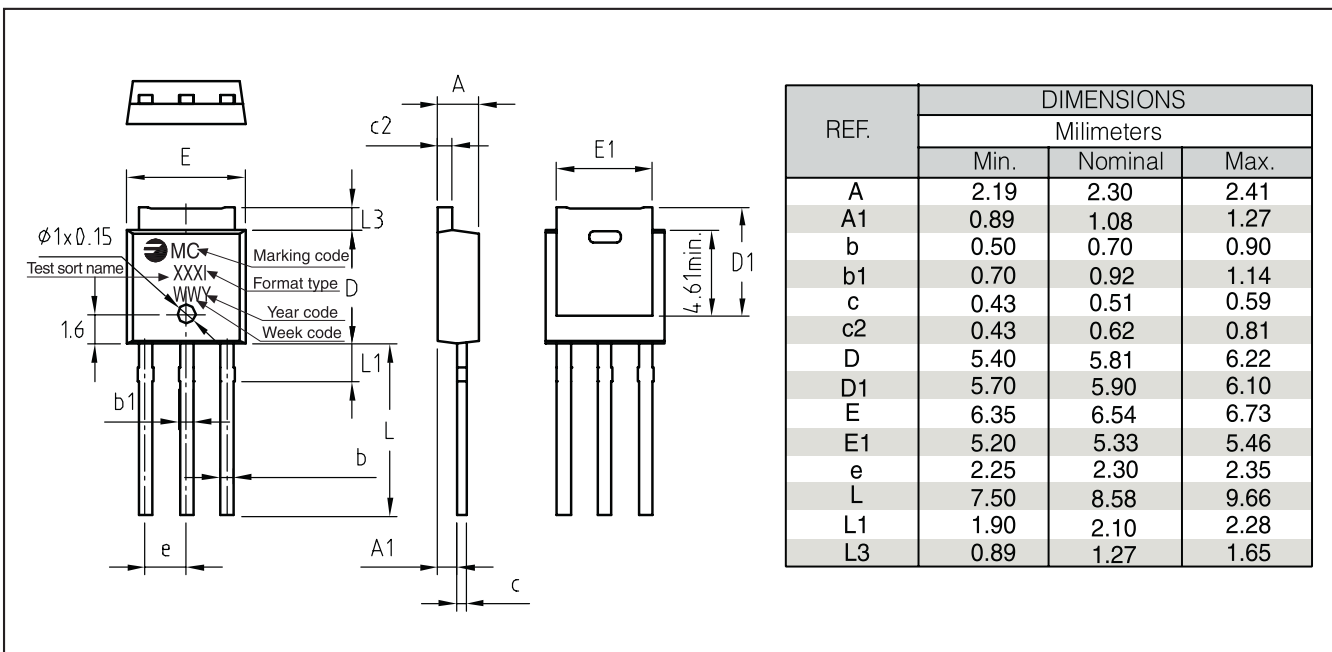
PREFERRED P/N	PACKAGE CODE	DELIVERY MODE	BASE QUANTITY	UNIT WEIGHT (g)
FS1209DD 00TR	TR	13" diameter tape and reel	2500	0.30

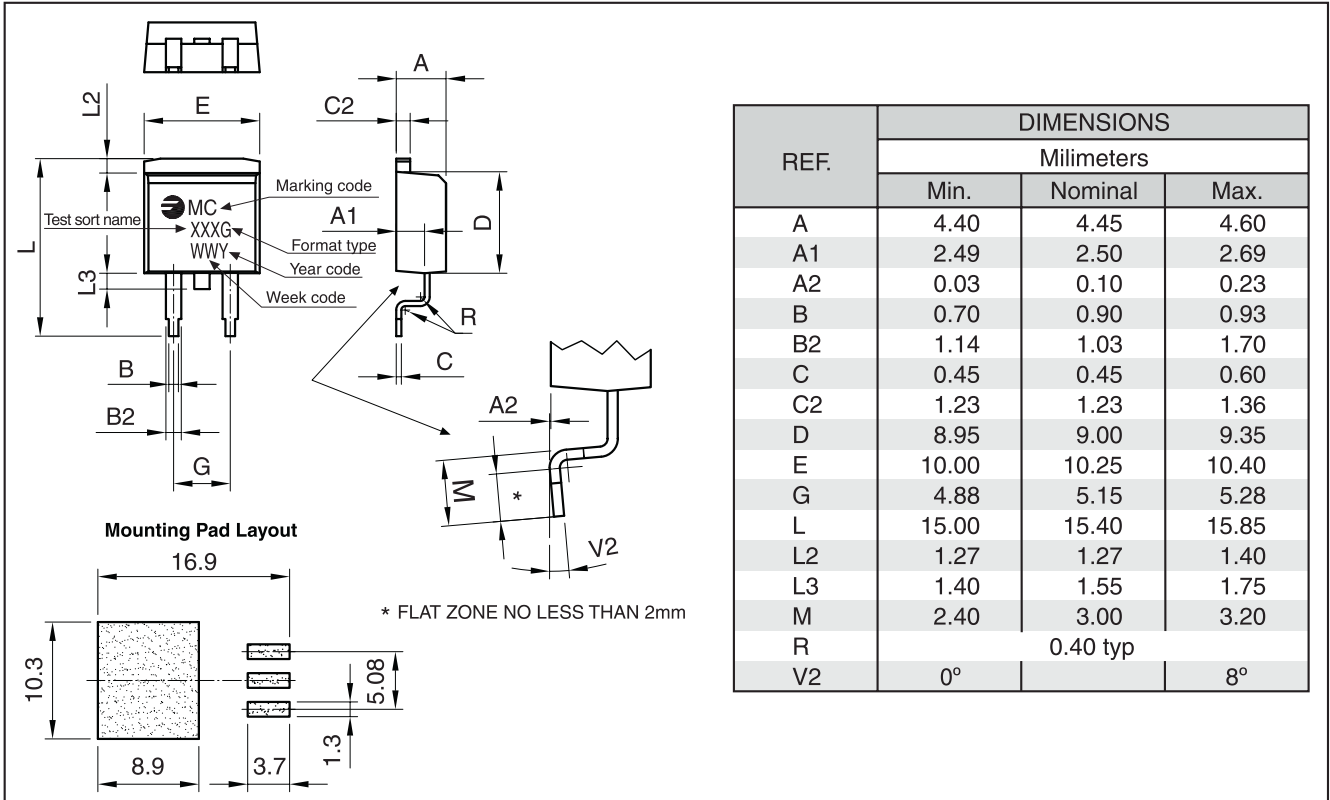
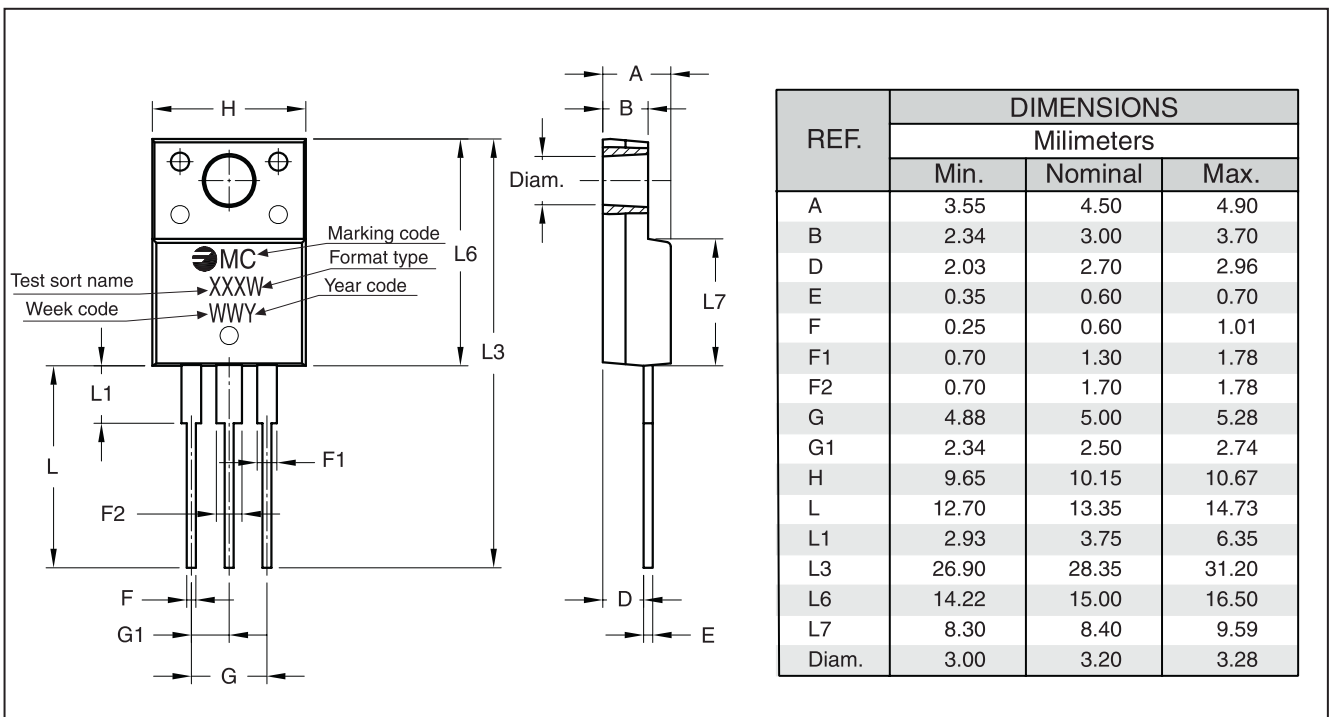
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FS1209DG 00TR	TR	13" diameter tape and reel	800	1.50

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

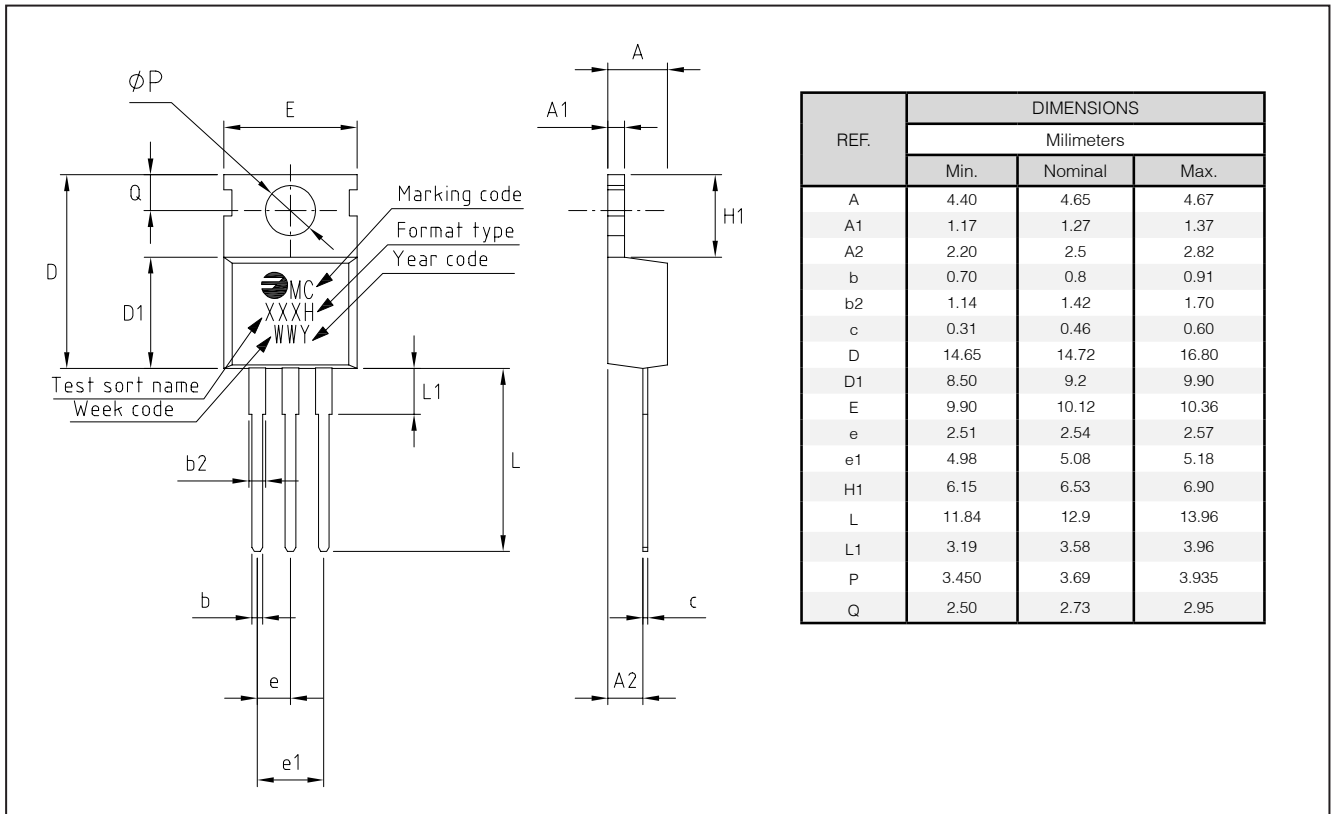
PREFERRED P/N	PACKAGE CODE	DELIVERY MODE	BASE QUANTITY	UNIT WEIGHT (g)
FS1209DI 00TU	TU	TUBE	4000	0.40

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

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

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


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

**Package Outline Dimensions: (mm) TO-220F**


Package Outline Dimensions: (mm) TO-220AB



REF.	DIMENSIONS		
	Milimeters		
	Min.	Nominal	Max.
A	4.40	4.65	4.67
A1	1.17	1.27	1.37
A2	2.20	2.5	2.82
b	0.70	0.8	0.91
b2	1.14	1.42	1.70
c	0.31	0.46	0.60
D	14.65	14.72	16.80
D1	8.50	9.2	9.90
E	9.90	10.12	10.36
e	2.51	2.54	2.57
e1	4.98	5.08	5.18
H1	6.15	6.53	6.90
L	11.84	12.9	13.96
L1	3.19	3.58	3.96
P	3.450	3.69	3.935
Q	2.50	2.73	2.95

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

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

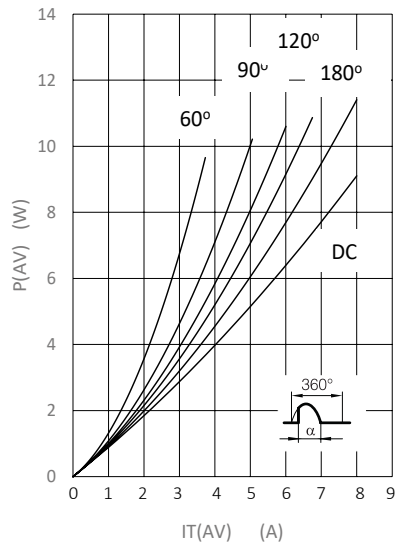


Fig. 2: Average and D.C. on-state current versus case temperature.

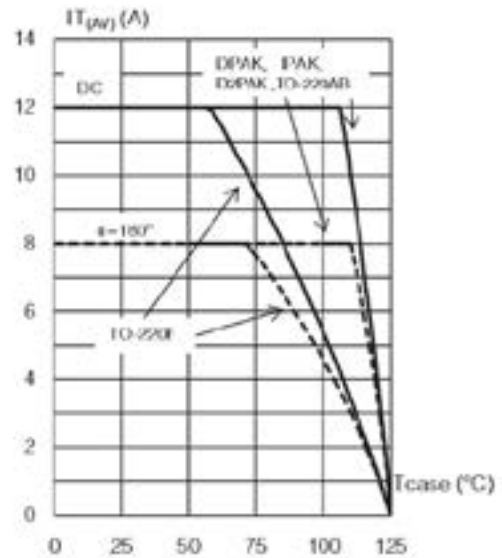


Fig. 3: Relative variation of thermal impedance junction to case versus pulse duration.

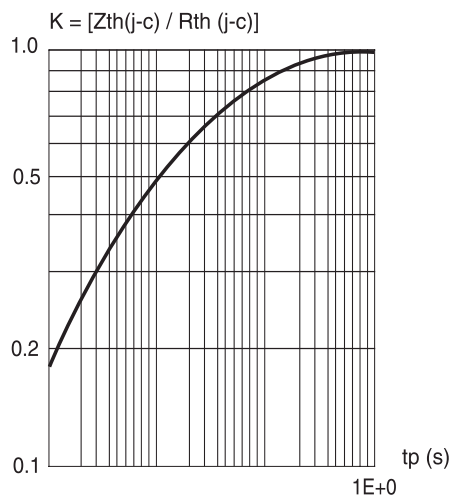
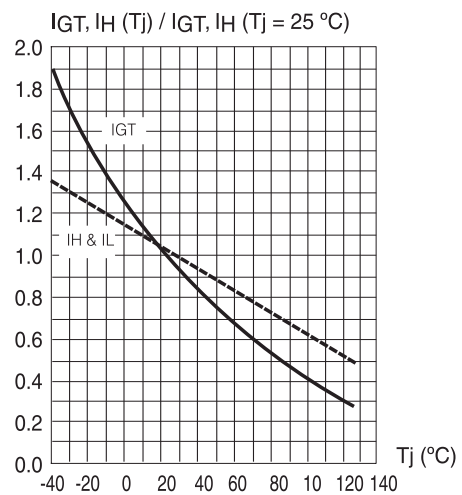


Fig. 4: Relative variation of gate trigger current, holding and latching current versus junction temperature for Sensitive Gate SCR (02).



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).

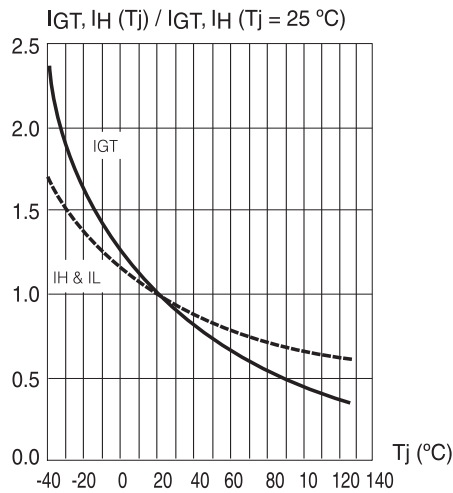


Fig. 6: Non repetitive surge peak on-state current versus number of cycles.

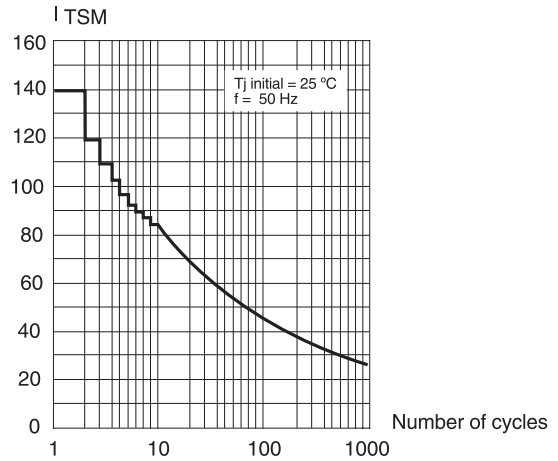


Fig. 7: Non repetitive surge peak on-state current for a sinusoidal pulse with width: tp < 10 ms, and corresponding value of I²t.

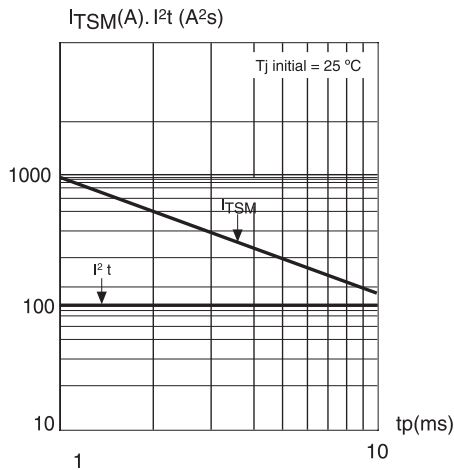
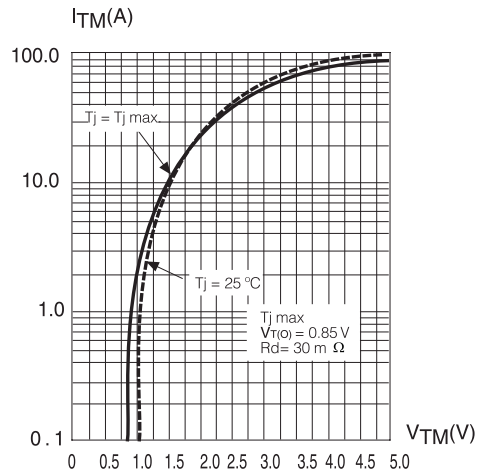


Fig. 8: On-state characteristics (maximum values).





## Revision History

DATE	REVISION	DESCRIPTION OF CHANGES
14-Oct-2014	0	Original Data Sheet
16-Dec-2014	1	Modified Typical Applications Description and Title
07-Jun-2019	2	Updated figure 1
28-Mar-2022	3	Revised P.O.D. TO220AB

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