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FEATURES **IEEE802.3af Compatible**

- Avalanche Rugged Technology
- Rugged Gate Oxide Technology
- Lower Input Capacitance
- Improved Gate Charge
- Extended Safe Operating Area
- Lower Leakage Current : 10 μ A (Max.) @ $V_{DS} = 100V$
- Lower $R_{DS(ON)}$: 0.155 Ω (Typ.)

$BV_{DSS} = 100 V$
 $R_{DS(on)} = 0.2 \Omega$
 $I_D = 2.3 A$

SOT-223



1. Gate 2. Drain 3. Source

Absolute Maximum Ratings

Symbol	Characteristic	Value	Units
V_{DSS}	Drain-to-Source Voltage	100	V
I_D	Continuous Drain Current ($T_A=25^\circ C$)	2.3	A
	Continuous Drain Current ($T_A=70^\circ C$)	1.84	
I_{DM}	Drain Current-Pulsed ^①	18	A
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy ^②	123	mJ
I_{AR}	Avalanche Current ^①	2.3	A
E_{AR}	Repetitive Avalanche Energy ^①	0.24	mJ
dv/dt	Peak Diode Recovery dv/dt ^③	6.5	V/ns
P_D	Total Power Dissipation ($T_A=25^\circ C$) *	2.4	W
	Linear Derating Factor *	0.019	W/ $^\circ C$
T_J, T_{STG}	Operating Junction and Storage Temperature Range	- 55 to +150	$^\circ C$
T_L	Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5-seconds	300	

Thermal Resistance

Symbol	Characteristic	Typ.	Max.	Units
$R_{\theta JA}$	Junction-to-Ambient *	--	52	$^\circ C/W$

* When mounted on the minimum pad size recommended (PCB Mount).

Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise specified)

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
BV_{DSS}	Drain-Source Breakdown Voltage	100	--	--	V	$V_{GS}=0V, I_D=250\mu A$
$\Delta BV/\Delta T_J$	Breakdown Voltage Temp. Coeff.	--	0.12	--	V/ $^\circ\text{C}$	$I_D=250\mu A$ See Fig 7
$V_{GS(th)}$	Gate Threshold Voltage	2.0	--	4.0	V	$V_{DS}=5V, I_D=250\mu A$
I_{GSS}	Gate-Source Leakage, Forward	--	--	100	nA	$V_{GS}=20V$
	Gate-Source Leakage, Reverse	--	--	-100		$V_{GS}=-20V$
I_{DSS}	Drain-to-Source Leakage Current	--	--	1	μA	$V_{DS}=30V$ ⑥
		--	--	10		$V_{DS}=100V$
		--	--	100		$V_{DS}=80V, T_A=125^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-State Resistance	--	--	0.2	Ω	$V_{GS}=10V, I_D=1.15A$ ④
g_{fs}	Forward Transconductance	--	3.12	--	S	$V_{DS}=40V, I_D=1.15A$ ④
C_{iss}	Input Capacitance	--	370	480	pF	$V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$ See Fig 5
C_{oss}	Output Capacitance	--	95	110		
C_{rss}	Reverse Transfer Capacitance	--	38	45		
$t_{d(on)}$	Turn-On Delay Time	--	14	40	ns	$V_{DD}=50V, I_D=9.2A,$ $R_G=18\Omega$ See Fig 13 ④ ⑤
t_r	Rise Time	--	14	40		
$t_{d(off)}$	Turn-Off Delay Time	--	36	90		
t_f	Fall Time	--	28	70		
Q_g	Total Gate Charge	--	16	22	nC	$V_{DS}=80V, V_{GS}=10V,$ $I_D=9.2A$ See Fig 6 & Fig 12 ④ ⑤
Q_{gs}	Gate-Source Charge	--	2.7	--		
Q_{gd}	Gate-Drain("Miller") Charge	--	7.8	--		

Source-Drain Diode Ratings and Characteristics

Symbol	Characteristic	Min.	Typ.	Max.	Units	Test Condition
I_S	Continuous Source Current	--	--	2.3	A	Integral reverse pn-diode in the MOSFET
I_{SM}	Pulsed-Source Current ①	--	--	18		
V_{SD}	Diode Forward Voltage ④	--	--	1.5	V	$T_J=25^\circ\text{C}, I_S=2.3A, V_{GS}=0V$
t_{rr}	Reverse Recovery Time	--	98	--	ns	$T_J=25^\circ\text{C}, I_F=9.2A$
Q_{rr}	Reverse Recovery Charge	--	0.34	--	μC	$di_F/dt=100A/\mu s$ ④

Notes ;

- ① Repetitive Rating : Pulse Width Limited by Maximum Junction Temperature
- ② $L=35\text{mH}, I_{AS}=2.3A, V_{DD}=25V, R_G=27\Omega,$ Starting $T_J=25^\circ\text{C}$
- ③ $I_{SD}\leq 9.2A, di/dt\leq 300A/\mu s, V_{DD}\leq BV_{DSS},$ Starting $T_J=25^\circ\text{C}$
- ④ Pulse Test : Pulse Width = $250\mu s,$ Duty Cycle $\leq 2\%$
- ⑤ Essentially Independent of Operating Temperature
- ⑥ Adjusted for Cisco

Fig 1. Output Characteristics

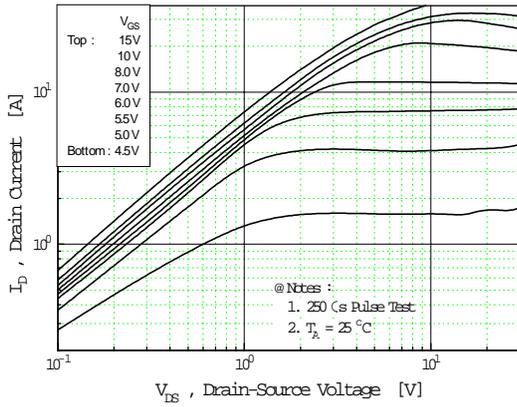


Fig 2. Transfer Characteristics

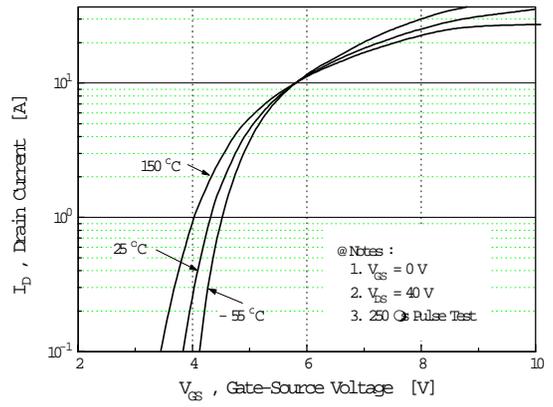


Fig 3. On-Resistance vs. Drain Current

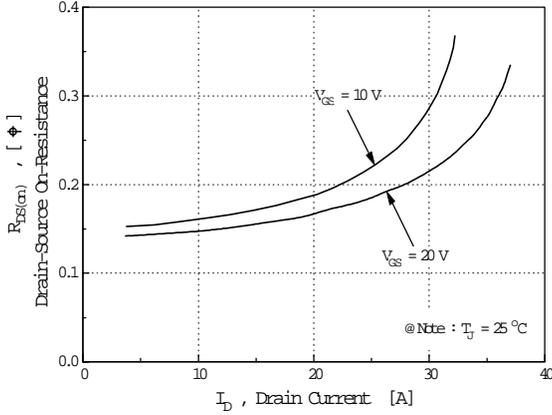


Fig 4. Source-Drain Diode Forward Voltage

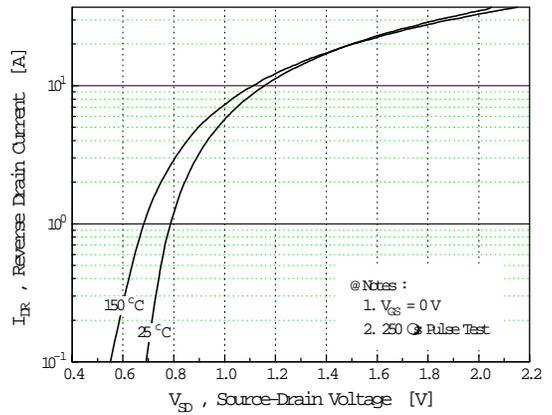


Fig 5. Capacitance vs. Drain-Source Voltage

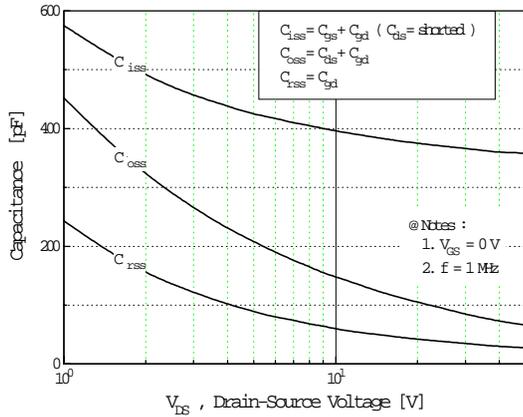


Fig 6. Gate Charge vs. Gate-Source Voltage

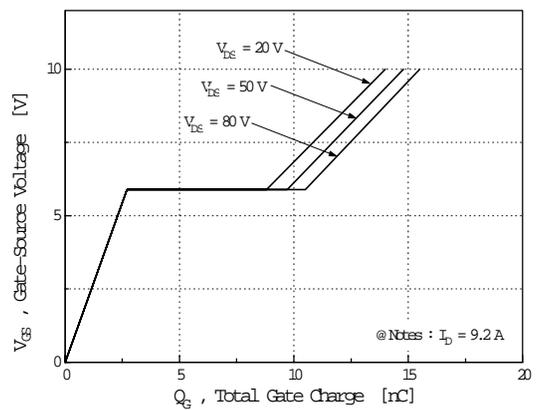


Fig 7. Breakdown Voltage vs. Temperature

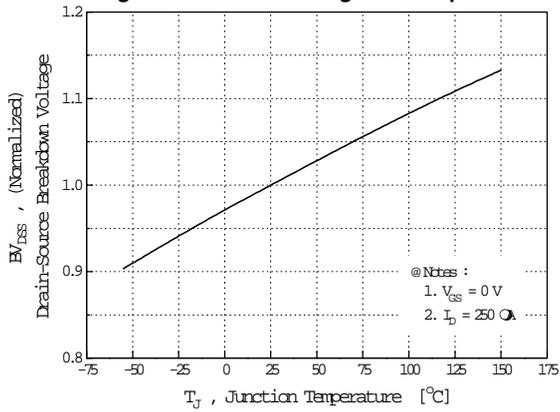


Fig 8. On-Resistance vs. Temperature

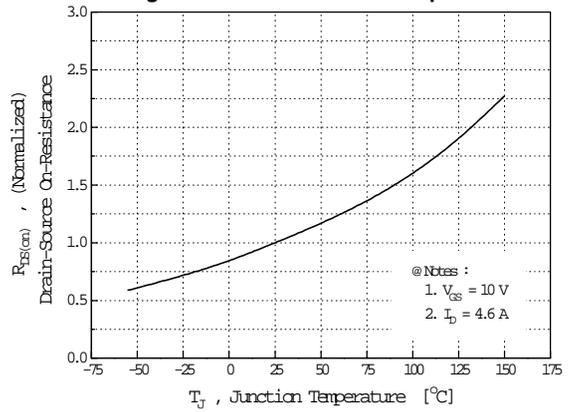


Fig 9. Max. Safe Operating Area

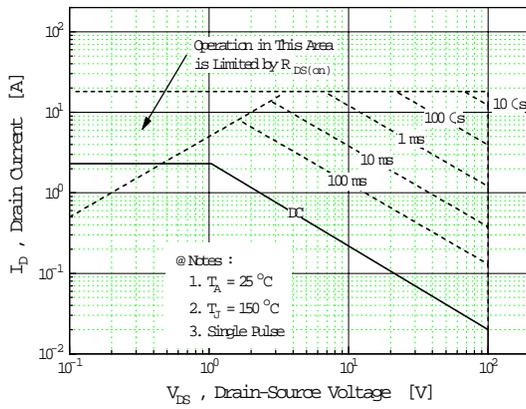


Fig 10. Max. Drain Current vs. Ambient Temperature

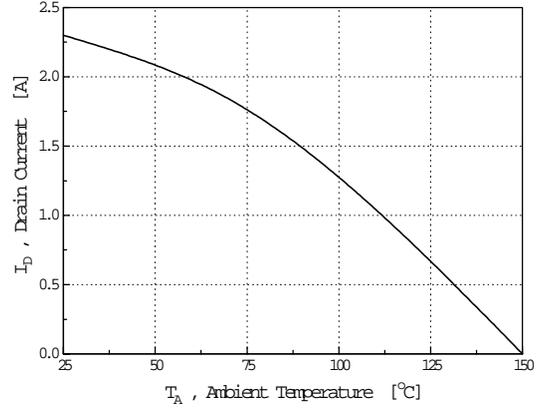


Fig 11. Thermal Response

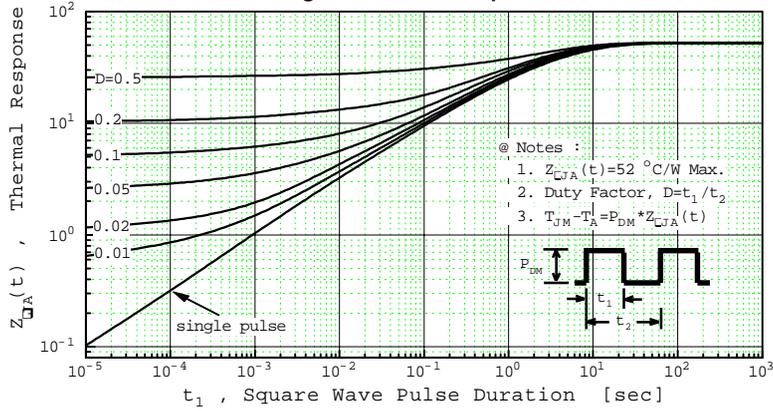


Fig 12. Gate Charge Test Circuit & Waveform

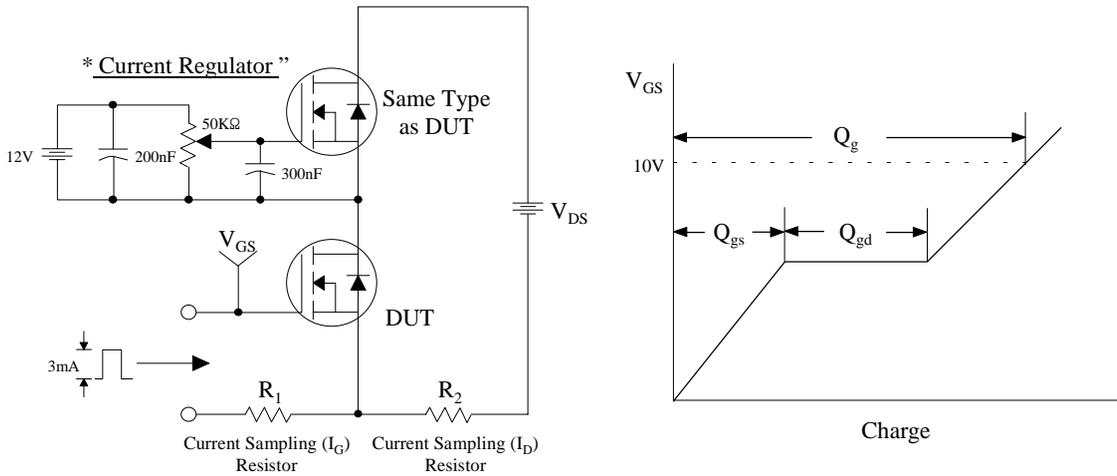


Fig 13. Resistive Switching Test Circuit & Waveforms

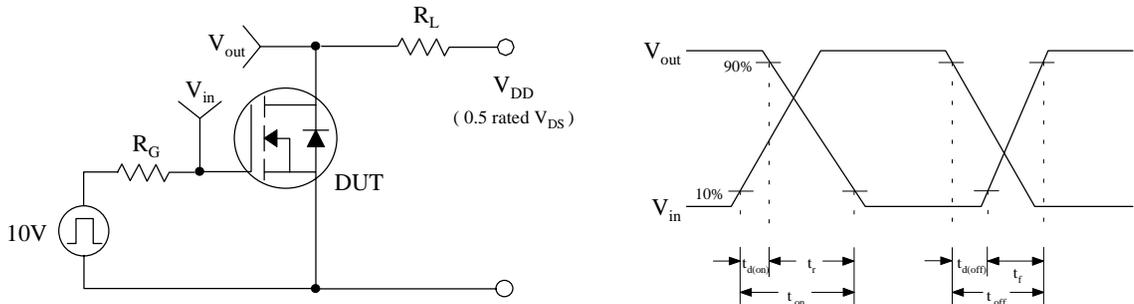


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

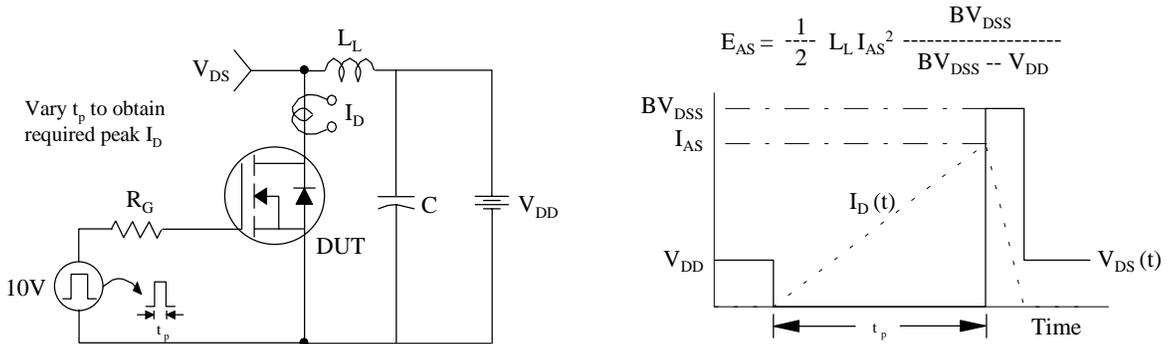
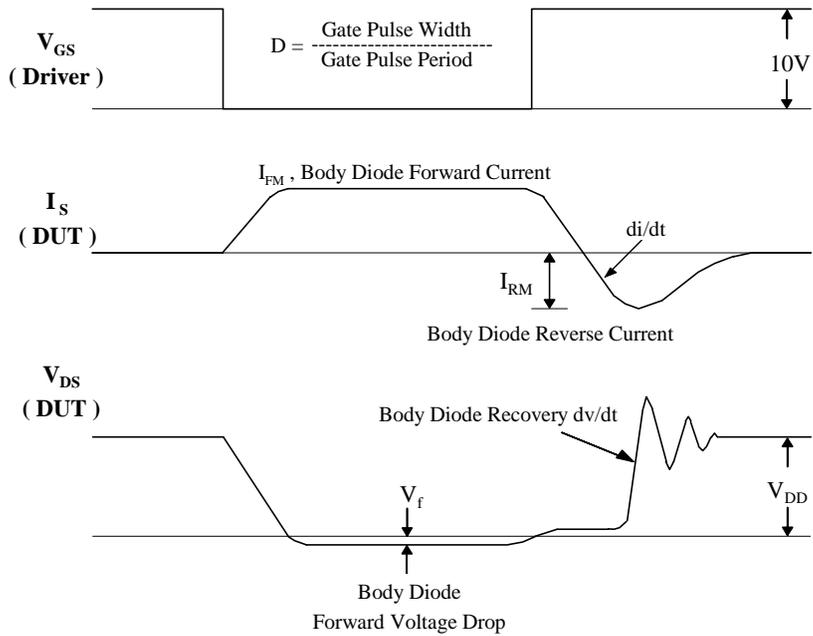
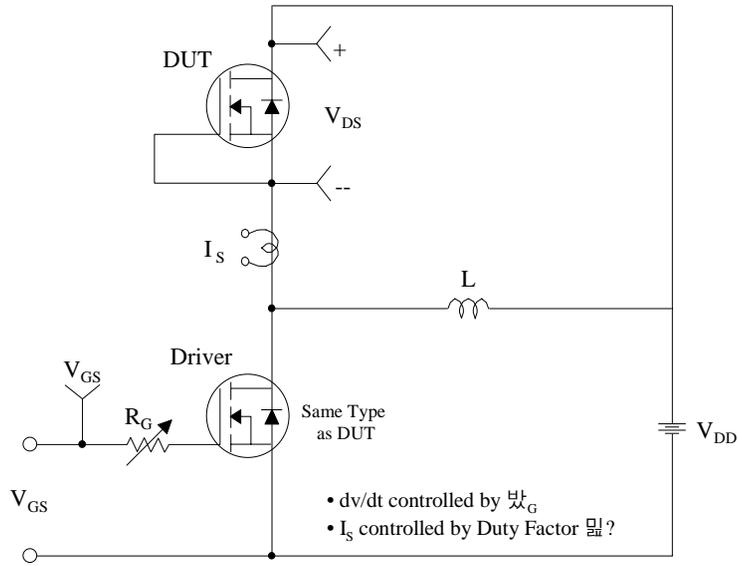
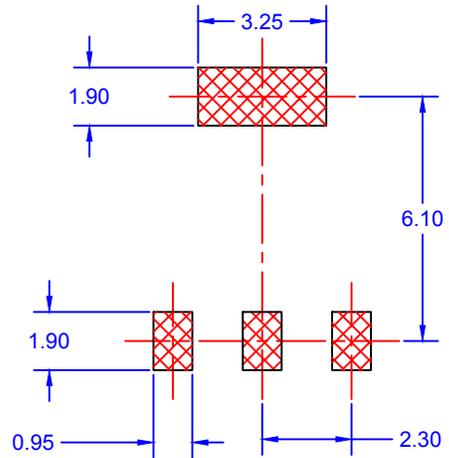
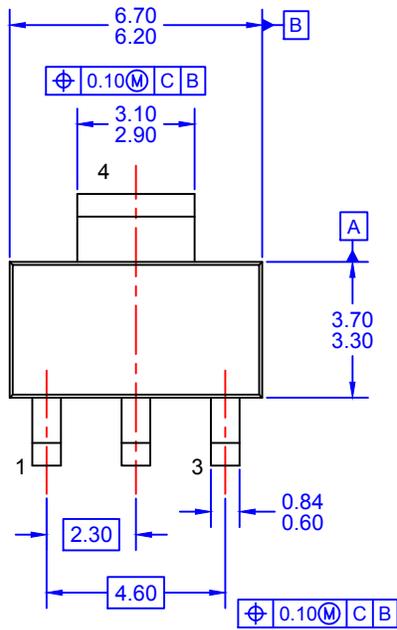
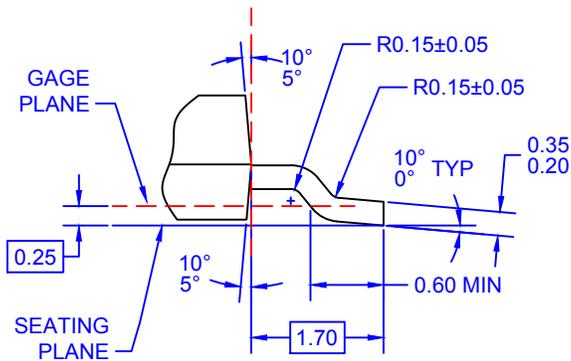
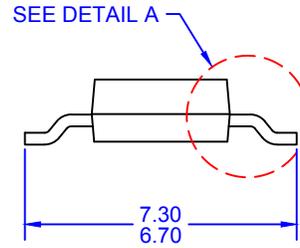
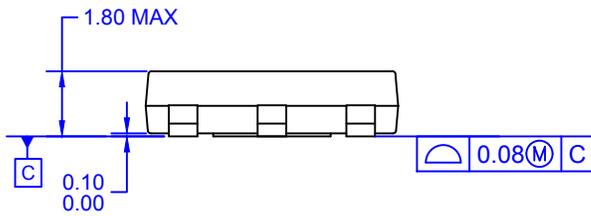


Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms





LAND PATTERN RECOMMENDATION



DETAIL A
SCALE: 2:1

- NOTES: UNLESS OTHERWISE SPECIFIED
 A) DRAWING BASED ON JEDEC REGISTRATION TO-261C, VARIATION AA.
 B) ALL DIMENSIONS ARE IN MILLIMETERS.
 C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.
 D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2009.
 E) LANDPATTERN NAME: SOT230P700X180-4BN
 F) DRAWING FILENAME: MKT-MA04AREV3



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