



N-Channel Enhancement Mode Power MOSFET **MXD50N06**

DESCRIPTION

The MXD50N06 combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. Those devices are suitable for use in PWM, load switching and general purpose applications.

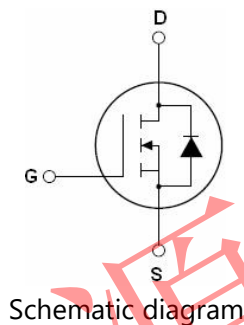
GENERAL FEATURES

- $V_{DS}=60V$, $I_D=50A$
 $R_{DS(ON)}(Typ.)=11.5m\Omega @ V_{GS}=10V$
- Ultra Low On-Resistance
- High UIS and UIS 100% Test

APPLICATION

- Power switching application
- Load switch

PINOUT



ORDERING INFORMATION

Device	Storage Temperature	Package	Devices Per Reel
MXD50N06	-55°C to 175°C	TO-252	-

KEY PERFORMANCE PARAMETERS ($T_A=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage ($V_{GS}=0V$)	V_{DS}	60	V
Gate-Source Voltage ($V_{DS}=0V$)	V_{GS}	± 25	V
Drain Current-Continuous ($T_C=25^\circ C$)	I_D	50	A
Drain Current-Continuous ($T_C=100^\circ C$)	I_D	31	A
Drain Current-Continuous@Current-Pulsed ^(Note 1)	$I_{DM(pluse)}$	180	A
Maximum Power Dissipation ($T_C=25^\circ C$)	P_D	68	W
Single Pulse Avalanche Energy ^(Note 2)	E_{AS}	196	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	$^\circ C$

THERMAL CHARACTERISTIC

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.2	$^\circ C/W$

Note 1. Repetitive Rating: Pulse width limited by maximum junction temperature

Note 2. E_{AS} condition: $T_J=25^\circ C, V_{DS}=30V, V_G=10V, R_G=25\Omega$



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ELECTRICAL CHARACTERISTICS ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
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On/Off Characteristics

Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	60	-	-	V	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=60V, V_{GS}=0V$	$T_C=25^\circ\text{C}$	-	-	1	μA
			$T_C=100^\circ\text{C}$	-	-	5	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 25V, V_{DS}=0V$	-	-	± 100	nA	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	-	4	V	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=40A$	-	11.5	15	m Ω	

Dynamic Characteristics

Forward Transconductance	g_{FS}	$V_{DS}=10V, I_D=15A$	18	-	-	S
Input Capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0V, F=1.0\text{MHz}$	-	1659	-	pF
Output Capacitance	C_{oss}		-	180	-	pF
Reverse Transfer Capacitance	C_{rss}		-	128	-	pF
Total Gate Charge	Q_g		$V_{DS}=30V, I_D=15A, V_{GS}=10V$	-	50	-
Gate-Source Charge	Q_{gs}	-		12	-	nC
Gate-Drain Charge	Q_{gd}	-		23	-	nC

Switching Characteristics

Turn-on Delay Time	$t_{d(on)}$	$V_{DS}=30V, R_L=2.5\Omega, V_{GS}=10V, R_G=3\Omega$	-	15	-	nS
Turn-on Rise Time	t_r		-	25	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	53	-	nS
Turn-Off Fall Time	t_f		-	23	-	nS

Source-Drain Diode Characteristics

Source-Drain Current(Body Diode)	I_{SD}		-	45	-	A
Pulsed Source-Drain Current(Body Diode)	I_{SDM}		-	180	-	A
Forward On Voltage ^(Note1)	V_{SD}	$T_J=25^\circ\text{C}, V_{GS}=0V, I_{SD}=1A$	-	0.89	0.99	V
Reverse Recovery Time ^(Note1)	t_{rr}	$T_J=25^\circ\text{C}, I_F=15A, di/dt=100A/\mu s$	-	24	-	nS
Reverse Recovery Charge ^(Note1)	Q_{rr}		-	30	-	nC
Forward Turn-on Time	t_{on}	Intrinsic turn-on time is negligible(turn-on is dominated by L_S+L_D)				

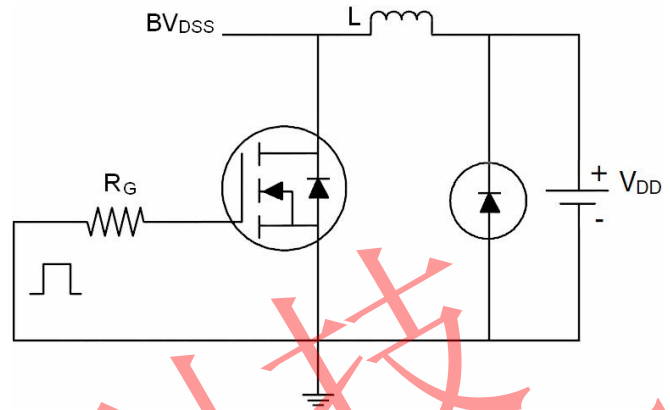
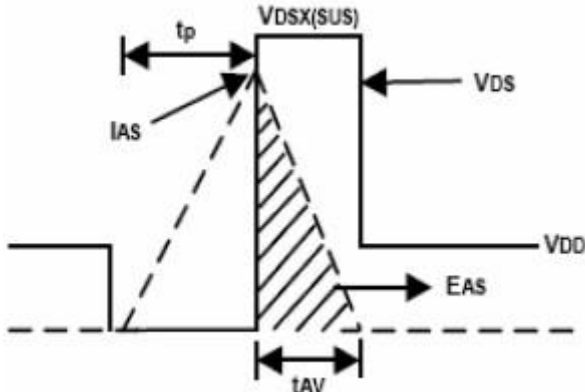
Note 1. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 1.5\%$, Starting $T_J=25^\circ\text{C}$



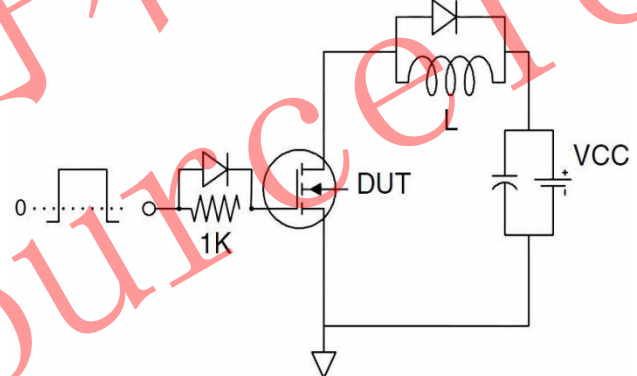
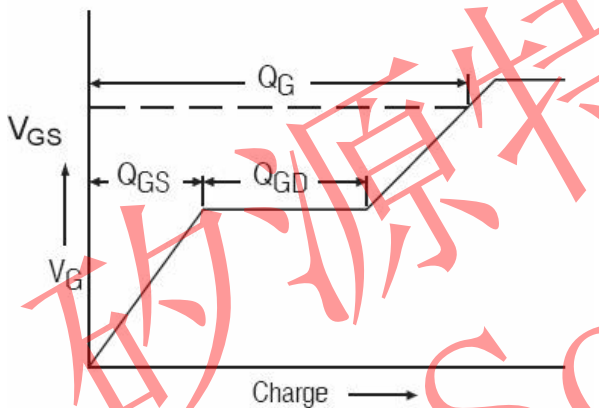
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TEST CIRCUIT

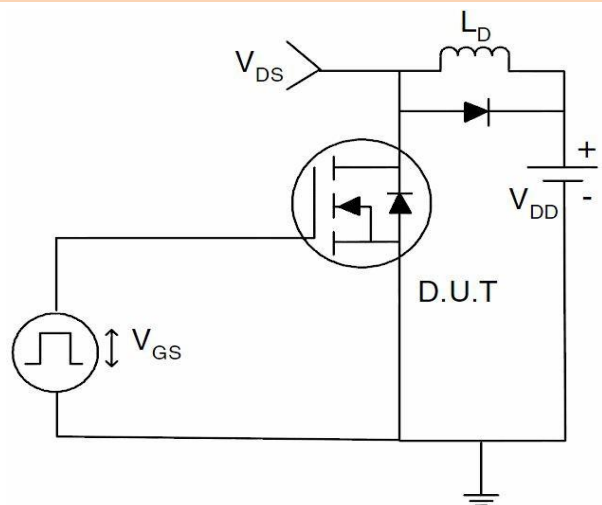
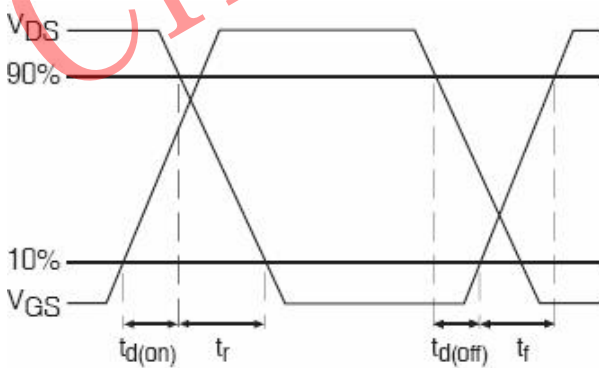
1) EAS Test Circuits



2) Gate Charge Test Circuit



3) Switch Time Test Circuit





TYPICAL PERFORMANCE CHARACTERISTICS

Figure1. Output Characteristics

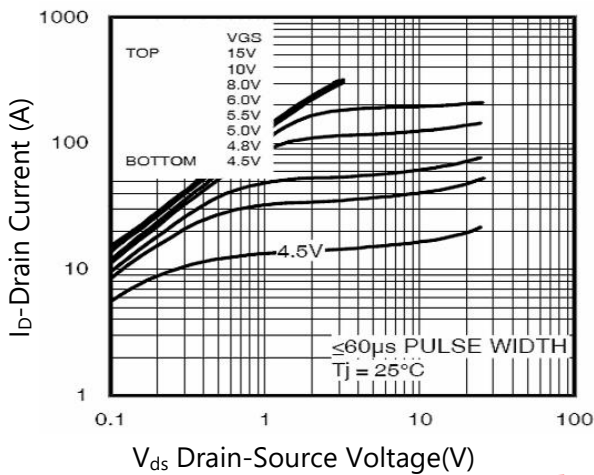


Figure2. Transfer Characteristics

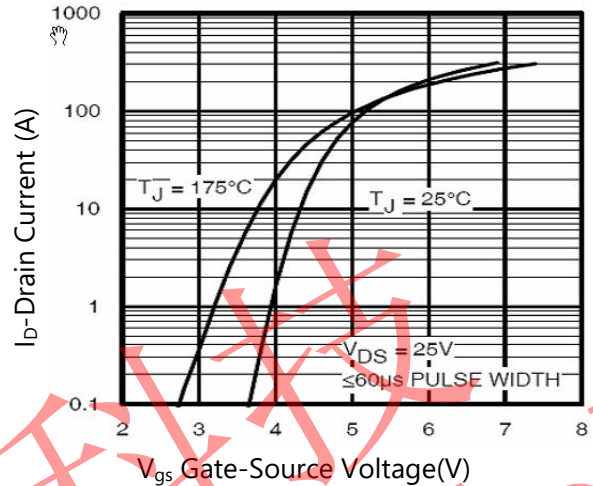


Figure3. BV_{DSS} vs Junction Temperature

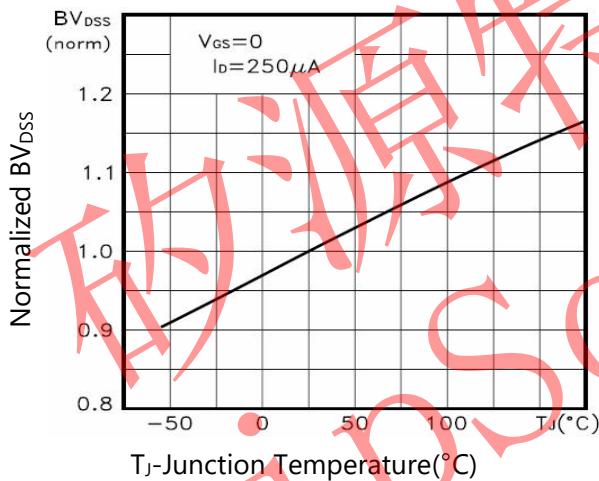


Figure4. Drain Current

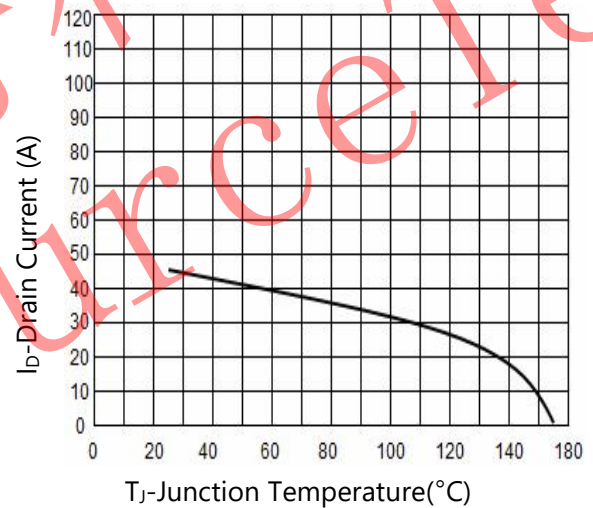


Figure5. V_{GS(th)} vs Junction Temperature

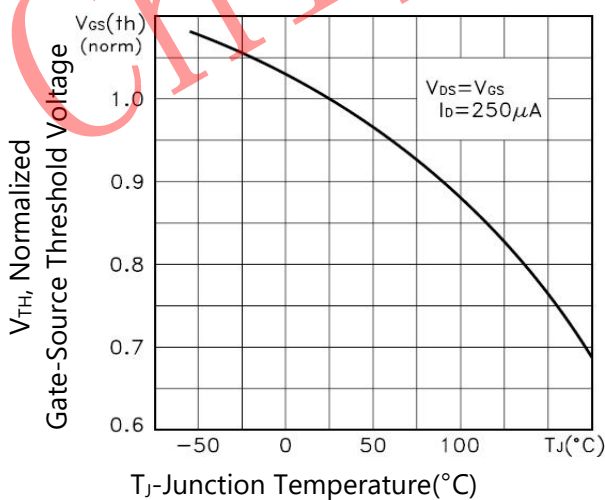
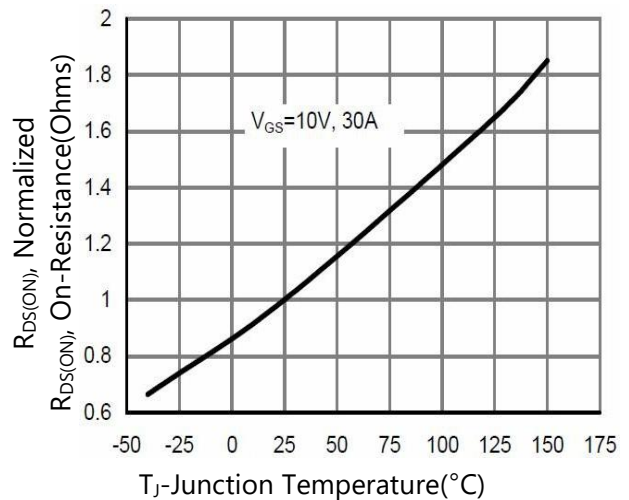


Figure6. R_{DS(ON)} vs Junction Temperature





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TYPICAL PERFORMANCE CHARACTERISTICS

Figure7. Gate Charge Waveforms

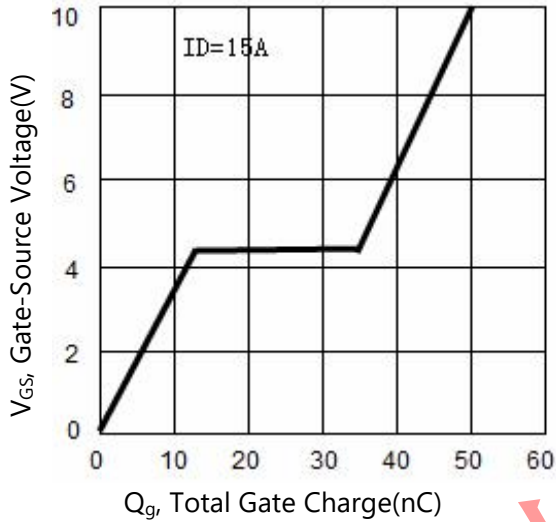


Figure8. Capacitance

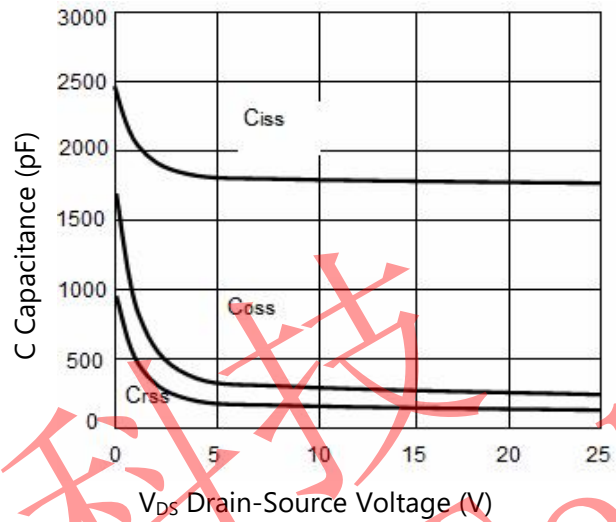


Figure9. Source-Drain Diode Forward

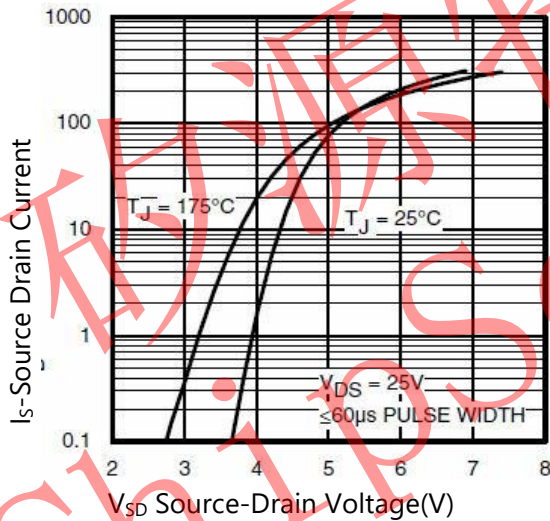


Figure10. Safe Operating Area

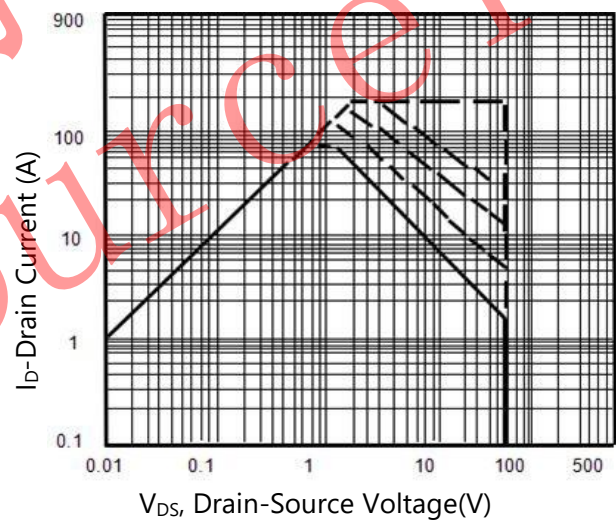
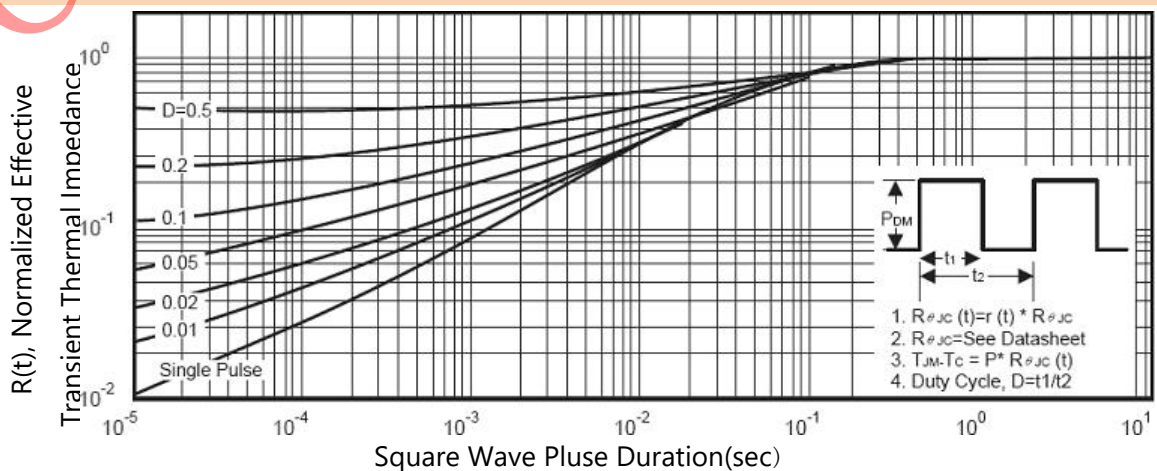


Figure11. Normalized Maximum Transient Thermal Impedance

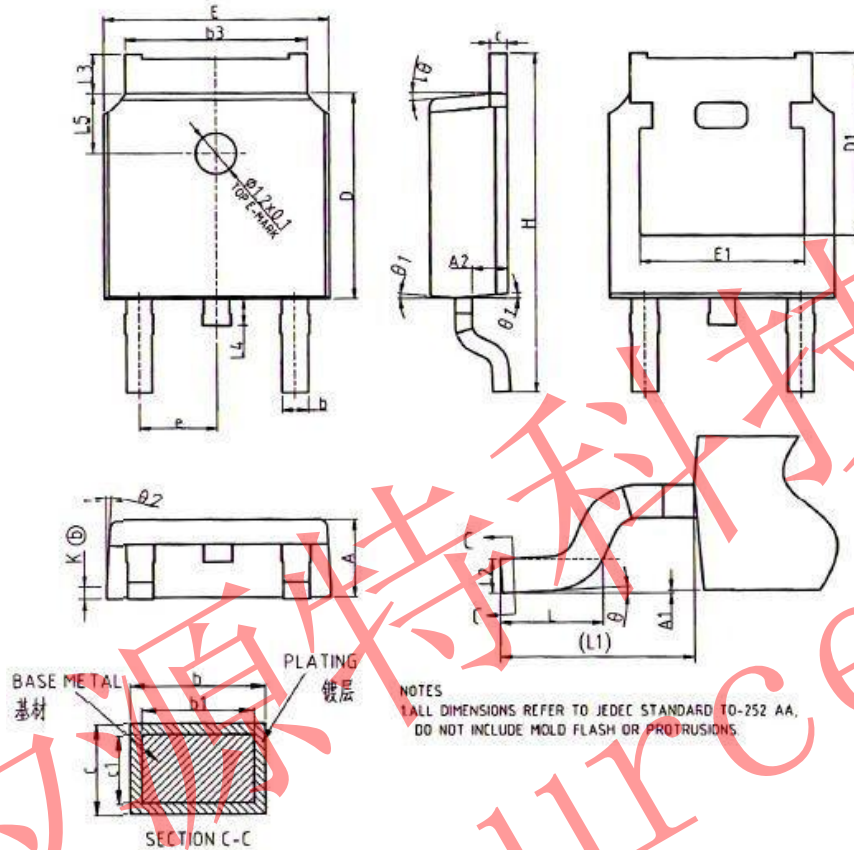




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PACKAGE INFORMATION

TO-252



SYMBOL	COMMON DIMENSIONS IN MILLIMETERS			SYMBOL	COMMON DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX		MIN	NOM	MAX
A	2.20	2.30	2.38	H	9.90	10.10	10.30
A1	0.00	-	0.10	L	1.40	1.50	1.70
A2	0.97	1.07	1.17	L1	2.90REF		
b	0.72	0.78	0.85	L2	0.51BSC		
b1	0.71	0.76	0.81	L3	0.90	-	1.25
b3	5.23	5.33	5.46	L4	0.60	0.80	1.00
c	0.47	0.53	0.58	L5	1.70	1.80	1.90
c1	0.46	0.51	0.56	θ	0°	-	8°
D	6.00	6.10	6.20	θ1	5°	7°	9°
D1	5.30REF			θ2	5°	7°	9°
E	6.50	6.60	6.70	K	0.40REF		
E1	4.70	4.83	4.92				
e	2.286BSC						