Wuxi Unigroup Microelectronics CO.,LTD.

30V P-Channel Trench MOSFET(Preliminary)

General Description

- Trench Power technology
- Low $R_{DS(ON)}$
- Low Gate Charge
- Optimized for fast-switching applications

Applications

- Synchronous Rectification in DC/DC and AC/DC Converters
- Isolated DC/DC Converters in Telecom and Industrial

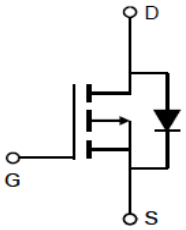
Product Summary

V_{DS}	-30V
I_D (at V_{GS}=10V)	-30A
$R_{DS(ON)}$ (at V_{GS}=-10V)	< 17mΩ
$R_{DS(ON)}$ (at V_{GS}=-4.5V)	< 30mΩ

100% UIS Tested

RoHS

TO-252



Part Number	Package Type	Form	Marking
TTD30P03AT	TO-252	Tape&Reel	30P03AT

Absolute Maximum Ratings (T_A =25°C unless otherwise noted)

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	- 30	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current [B]	T_C =25°C	I_D	-30	A
	T_C =100°C		-21	
Pulsed Drain Current [A]		I_{DM}	-90	A
Avalanche Current [A]		I_{AS}	-20	A
Single Pulse Avalanche Energy L =0.3mH [A]		E_{AS}	60	mJ
Power Dissipation [C]	T_C =25°C	P_D	60	W
	T_C =100°C		30	W
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	°C

Thermal Characteristics

Parameter		Symbol	Maximum	Units
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	2.5	°C/W
Maximum Junction-to-Ambient	Steady-State	$R_{\theta JA}$	100	

Electrical Characteristics(T_J =25ºC unless otherwise noted)

Symbol	Parameter	Conditions		Value			Units
				Min	Typ	Max	
STATIC PARAMETERS							
BV_{DSS}	Drain-Source Breakdown Voltage	I_D =-250μA,V_{GS} =0V		-30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} =-30V, V_{GS} =0V	T_J =25ºC			-1	μA
			T_J =100ºC			-100	
I_{GSS}	Gate-Body Leakage Current	V_{DS} =0V, V_{GS} =±20V				±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} =V_{GS}, I_D =-250μA		-1	-1.7	-2.4	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} =-10V, I_D =-20A			14	17	mΩ
		V_{GS} =-4.5V, I_D =-20A			24	30	mΩ
g_{FS}	Forward Transconductance	V_{DS} =-5V, I_D =-20A			20		S
V_{SD}	Diode Forward Voltage	I_S =-15A, V_{GS} =0V				-1	V
I_S	Maximum Body-Diode Continuous Current [B]					-30	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS} =0V, V_{DS} =-15V, f =1MH_Z			2087		pF
C_{oss}	Output Capacitance				236		
C_{rss}	Reverse Transfer Capacitance				216		
SWITCHING PARAMETERS							
Q_g(10V)	Total Gate Charge	V_{GS} =-10V,V_{DS} =-15V, I_D =-20A			41		nC
Q_{gs}	Gate Source Charge				9		
Q_{gd}	Gate Drain Charge				6		
$t_{D(on)}$	Turn-On Delay Time	V_{GS} =-10V,V_{DS} =-15V, I_D =-20A, R_G =2.5Ω			10		ns
t_r	Turn-On Rise Time				15		
$T_{D(off)}$	Turn-Off Delay Time				50		
t_f	Turn-Off Fall Time				20		
t_{rr}	Body Diode Reverse Recovery Time	I_F =-15A, di/dt =100A/μs			24		ns
Q_{rr}	Body Diode Reverse Recovery Charge				16		nC

A. Single pulse width limited by maximum junction temperature.

B. The maximum current rating is package limited.

C. The power dissipation P_D is based on $T_{J(MAX)}$ =175ºC, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

Typical Characteristics T_J = 25ºC, unless otherwise noted

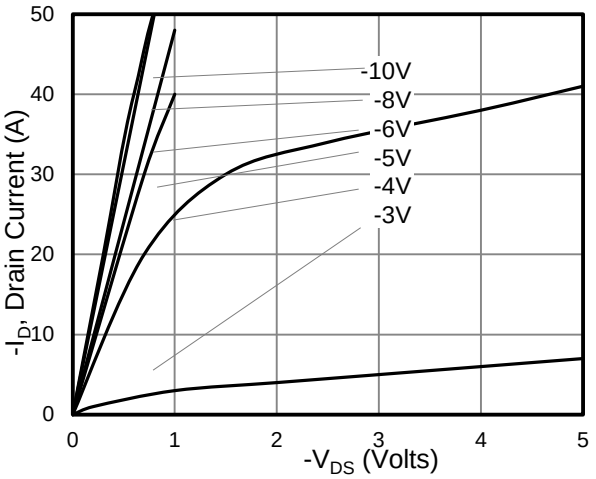


Figure 1: On-Region Characteristics

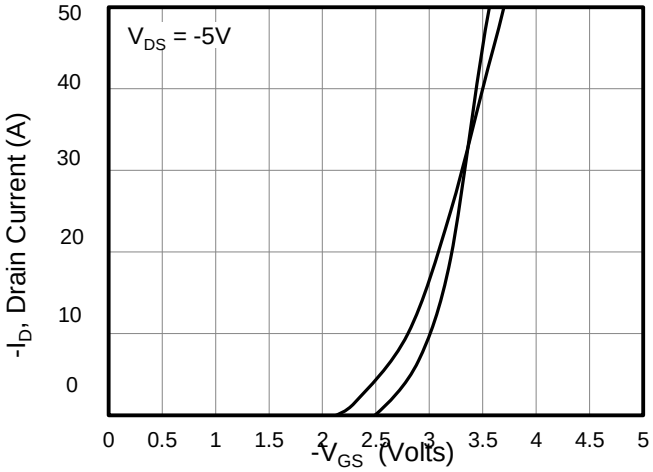


Figure 2: Transfer Characteristics

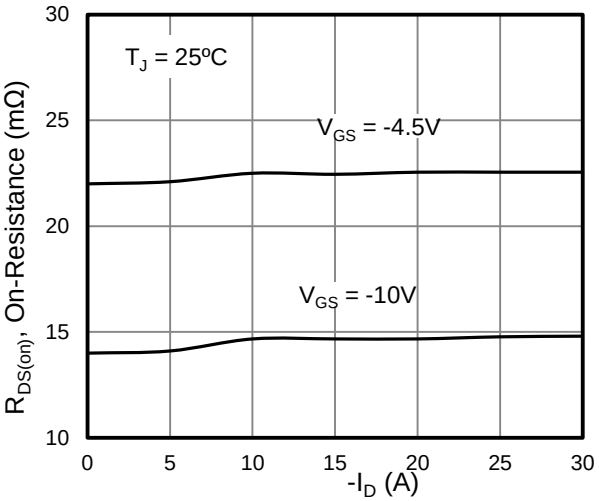


Figure 3: On-Resistance vs. Drain Current

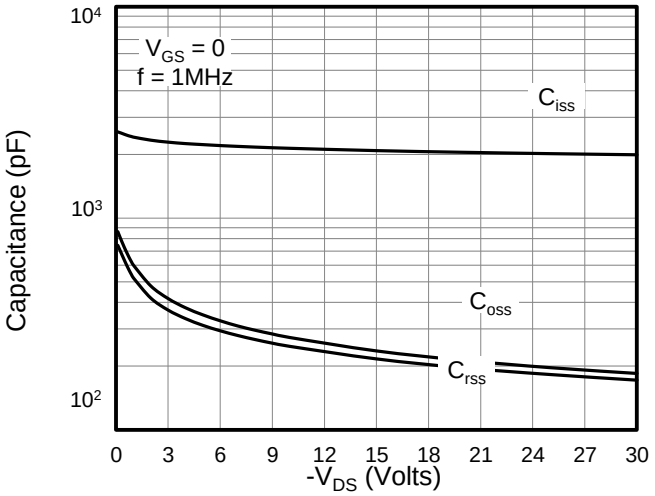


Figure 4: Capacitance Characteristics

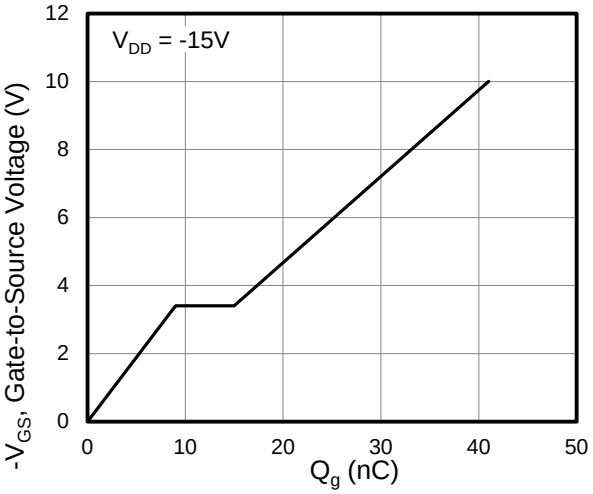


Figure 5: Gate Charge Characteristics

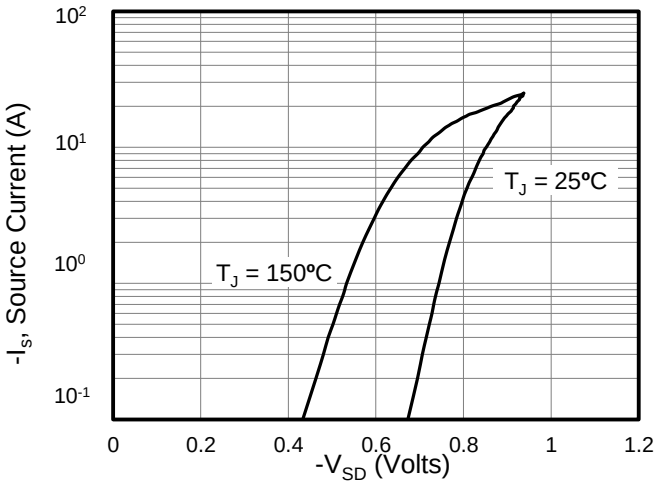


Figure 6: Body Diode Forward Voltage

Typical Characteristics T_J = 25ºC, unless otherwise noted

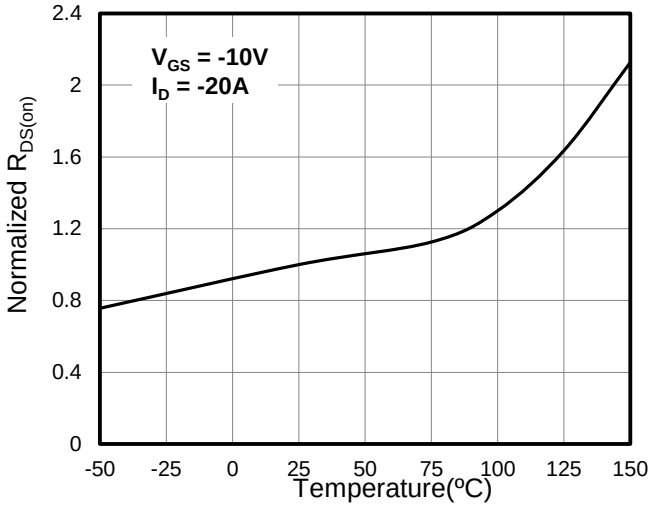


Figure 7: On-Resistance vs. Junction Temperature

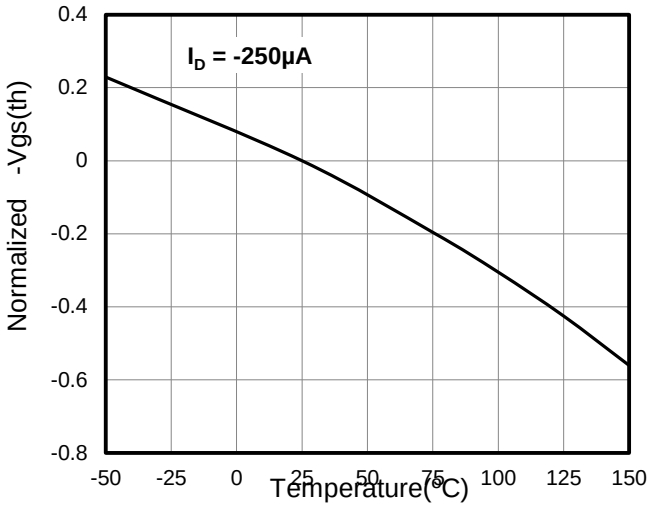


Figure 8: Vgs(th) vs. Junction Temperature

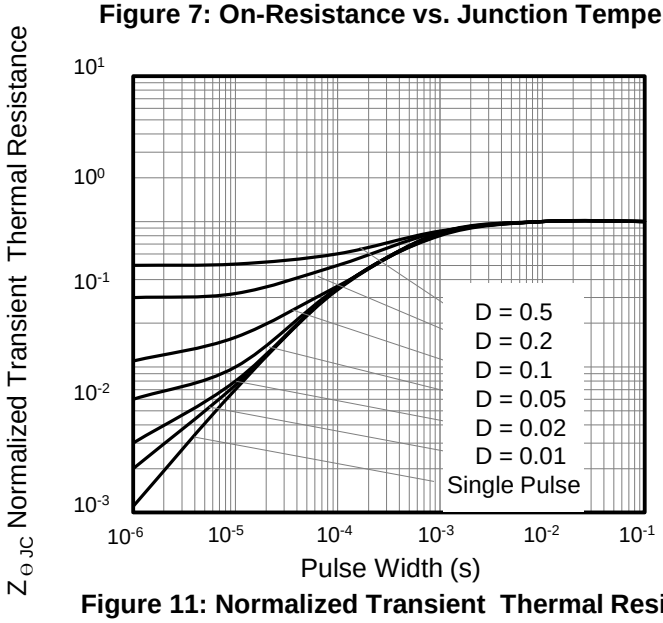


Figure 11: Normalized Transient Thermal Resistance

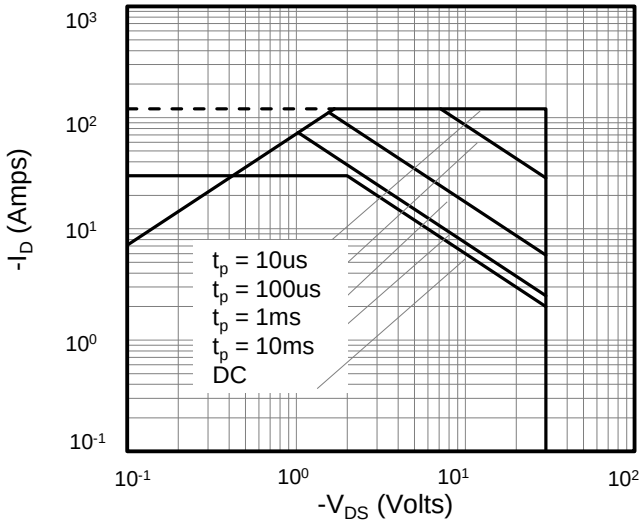


Figure 12: Safe Operating Area

Figure A：Gate Charge Test Circuit and Waveform

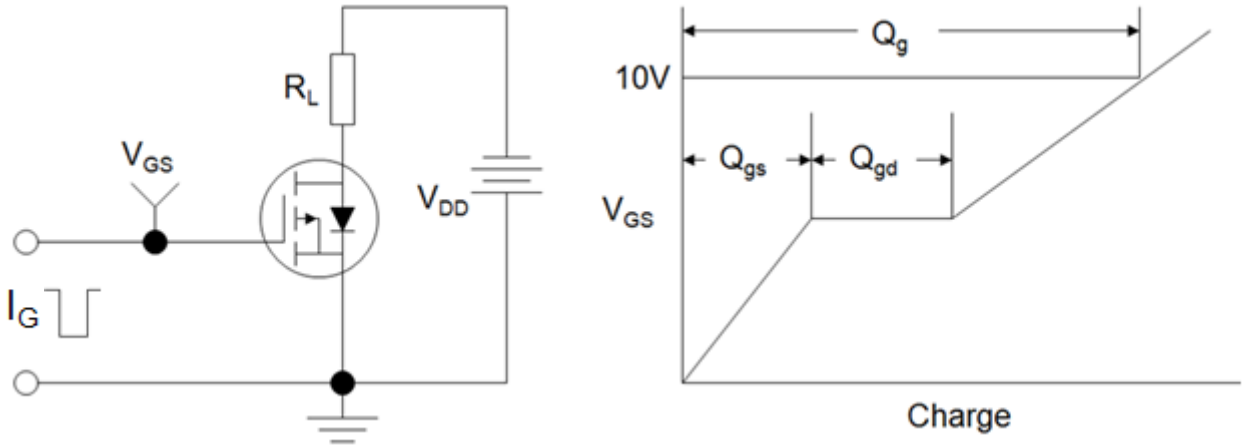


Figure B：Resistive Switching Test Circuit and Waveform

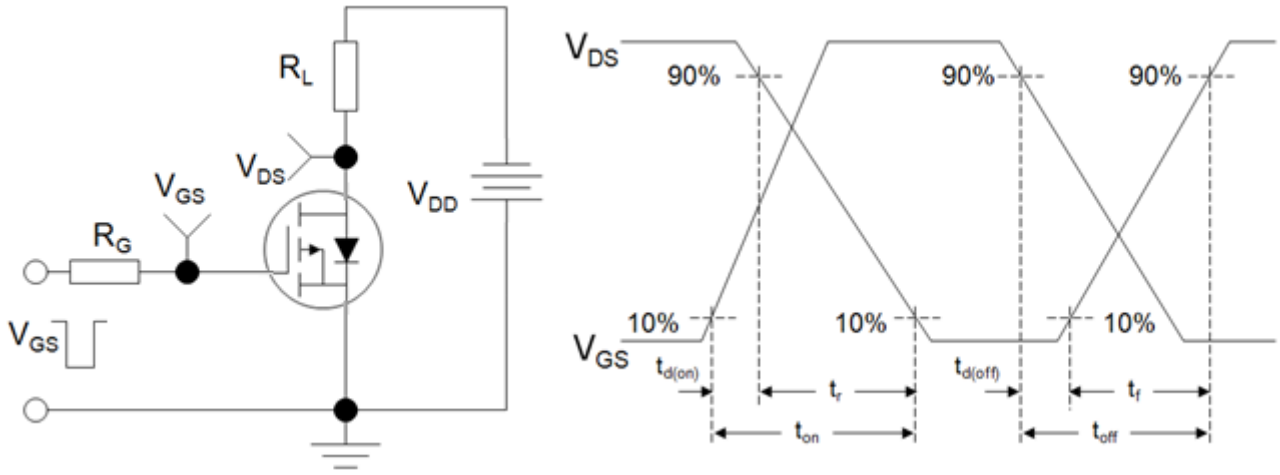
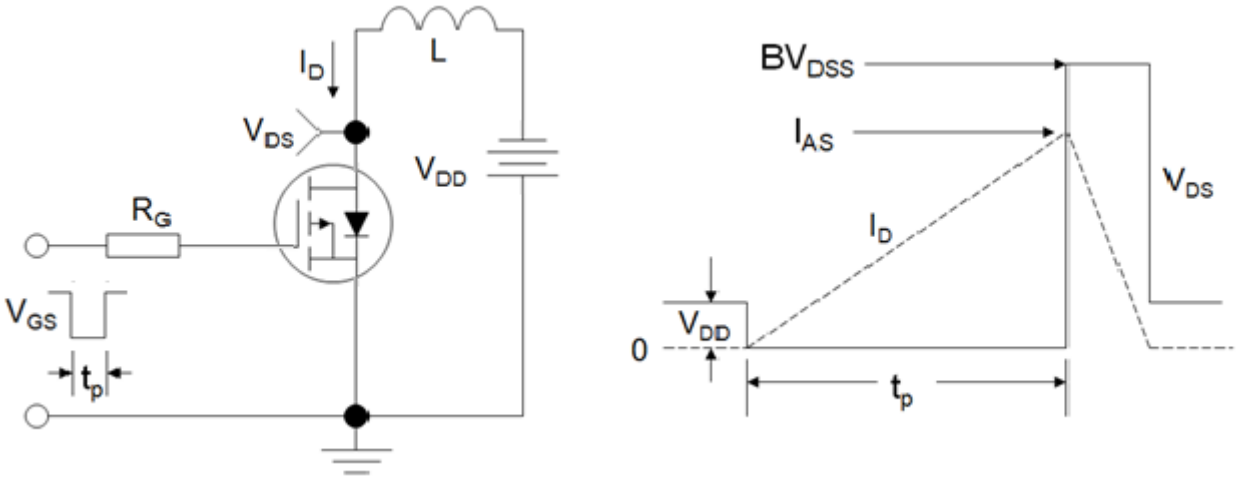
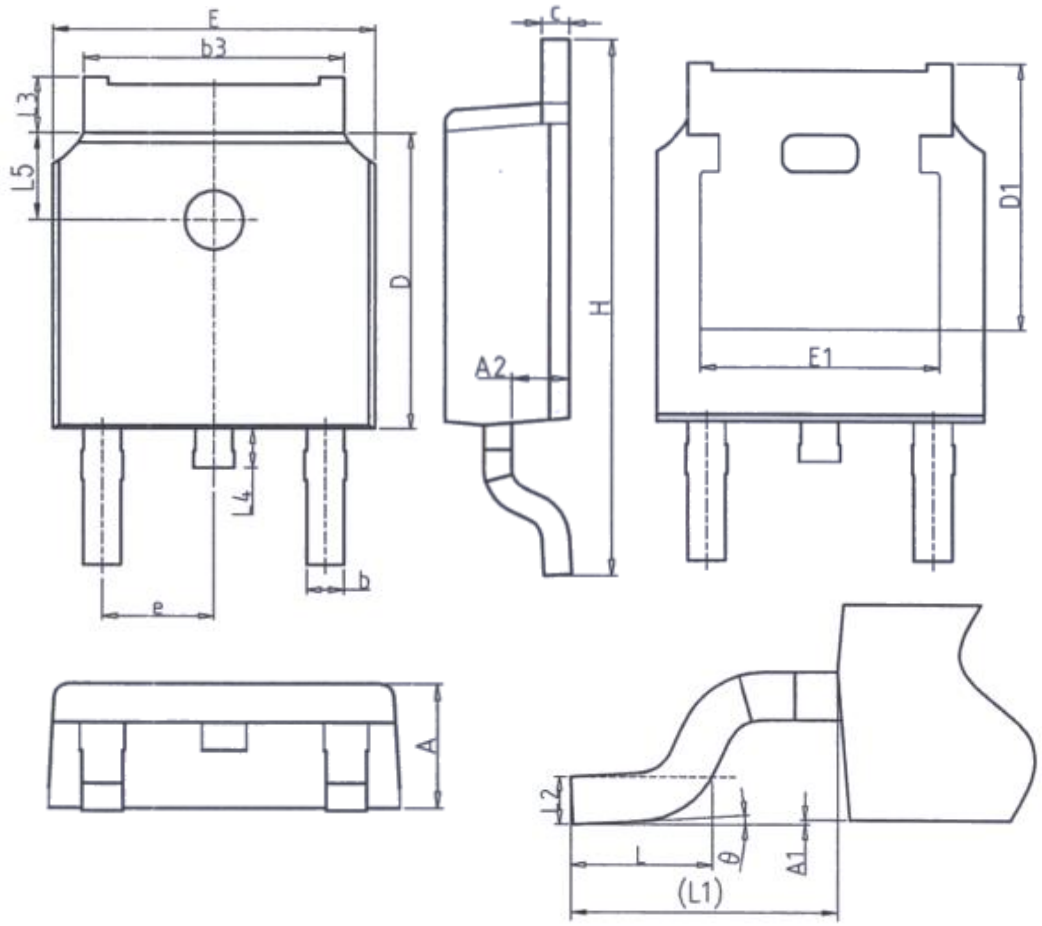


Figure C：Unclamped Inductive Switching Test Circuit and Waveform



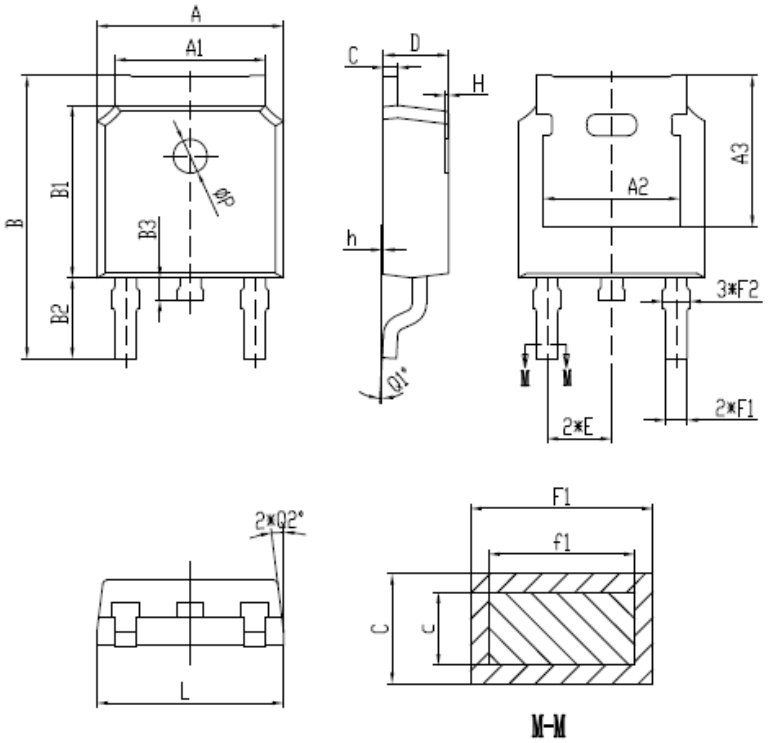
TO-252(华天)



Unit: mm		
Symbol	Min.	Max.
A	2.20	2.40
A1	0.00	0.20
A2	0.97	1.17
b	0.68	0.90
b3	5.20	5.50
c	0.43	0.63
D	5.98	6.22
D1	5.30REF	
E	6.40	6.80
E1	4.63	–

Unit: mm		
Symbol	Min.	Max.
e	2.286BSC	
H	9.40	10.50
L	1.38	1.75
L1	2.90REF	
L2	0.51BSC	
L3	0.88	1.28
L4	–	1.00
L5	1.65	1.95
θ	0°	8°

TO-252(海天)



SYMBOL	MIN	NOM	MAX
A	6.50	6.60	6.70
A1	5.16	5.31	5.46
A2		4.83 REF	
A3		5.30 REF	
B	9.77	9.97	10.17
B1	6.00	6.10	6.20
B2	2.60	2.80	3.00
B3	0.70	0.80	0.90
C	0.41	—	0.61
c	0.40	0.50	0.60
D	2.20	2.30	2.40
E	2.186	2.286	2.386
F1	0.67	—	0.87
f1	0.66	0.76	0.86
F2	0.76	0.86	0.96
H	0.00	—	0.30
h	0.00	—	0.20
L	6.50	6.60	6.70
øP	1.10	1.20	1.30
Q1°	0°	—	8°
Q2°	6°	7°	8°

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