Wuxi Unigroup Microelectronics CO.,LTD.

150V N-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

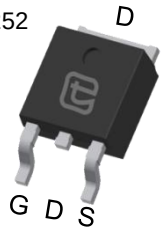
Product Summary

V_{DS}	150V
I_D (at V_{GS}=10V)	2A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 300mΩ
$R_{DS(ON)}$ (at V_{GS}=4.5V)	< 338mΩ

100% UIS Tested

RoHS

TO-252



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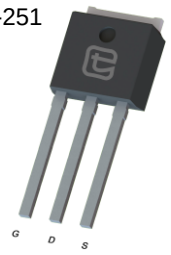
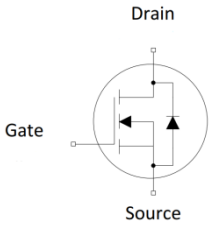




Device	Package	Form	Marking
TMD02N15AT	TO-252	Tape&Reel	02N15AT
TMU02N15AT	TO-251	Tube	02N15A

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	150	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	T_C = 25ºC	I_D	2	A
	T_C = 100ºC		1.4	
Pulsed Drain Current [A]		I_{DM}	6	A
Avalanche Current [A]		I_{AS}	1.3	V
Single Pulse Avalanche Energy L =0.3mH [A]		E_{AS}	3	mJ
Power Dissipation [C]	T_C = 25ºC	P_D	33	W
	T_C = 100ºC		16.7	W
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 175	ºC

Thermal Resistance

Parameter		Symbol	Maximum	Units
Thermal Resistance, Junction-to-Case	Steady-State	R_{thJC}	4.5	ºC/W
Thermal Resistance, Junction-to-Ambient	Steady-State	R_{thJA}	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		150	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} =150V, V_{GS} =0V	T_J =25ºC	--	--	1	μA
			T_J =100ºC	--	--	25	
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		1.5	2.0	2.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} =10V, I_D =1.5A		--	238	300	mΩ
		V_{GS} = 4.5V, I_D = 1.5A		--	246	338	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 5V, I_D =1.5A		3.4	--	--	S
V_{SD}	Diode Forward Voltage	I_S =2A, V_{GS} =0V		--	--	1	V
I_S	Maximum Body-Diode Continuous Current [B]			--	--	2	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS} =0V, V_{DS} = 75V, f =1MH_Z		--	568	--	pF
C_{oss}	Output Capacitance			--	16	--	
C_{rss}	Reverse Transfer Capacitance			--	11.6	--	
SWITCHING PARAMETERS							
Q_g(10V)	Total Gate Charge	V_{GS} =10V,V_{DS} =75V, I_D =2A		--	17	--	nC
Q_{gs}	Gate Source Charge			--	1.5	--	
Q_{gd}	Gate Drain Charge			--	4	--	
$t_{D(on)}$	Turn-On Delay Time	V_{GS} =10V,V_{DS} =75V, I_D =2A, R_G =2.5Ω		--	9	--	ns
t_r	Turn-On Rise Time			--	11	--	
$T_{D(off)}$	Turn-Off Delay Time			--	18	--	
t_f	Turn-Off Fall Time			--	14	--	
t_{rr}	Body Diode Reverse Recovery Time	I_F = 2A, di/dt =100A/μs		--	10	--	ns
Q_{rr}	Body Diode Reverse Recovery Charge			--	5	--	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

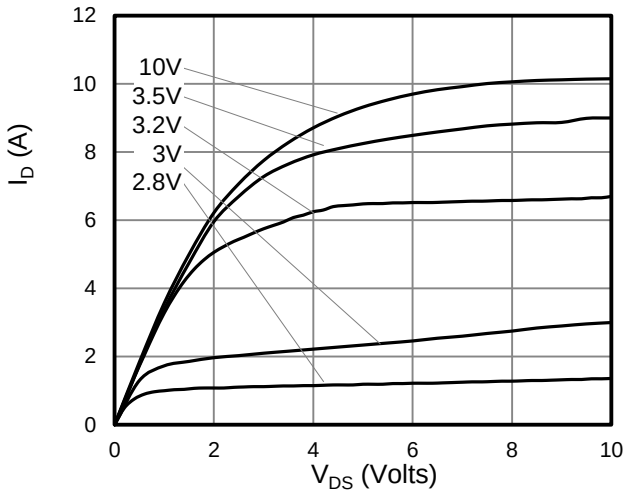


Figure 1: On-Region Characteristics

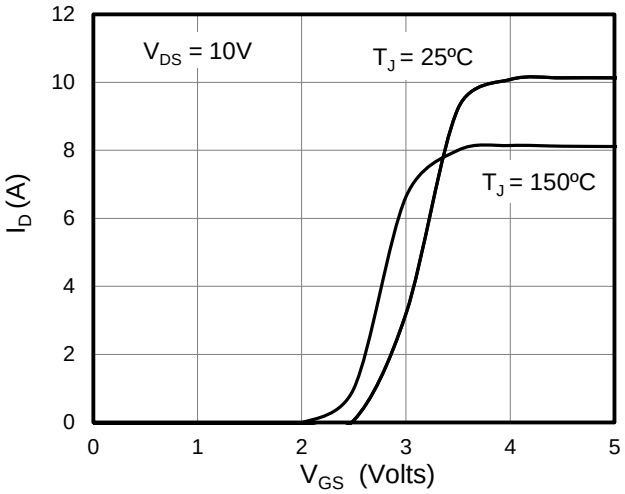


Figure 2: Transfer Characteristics

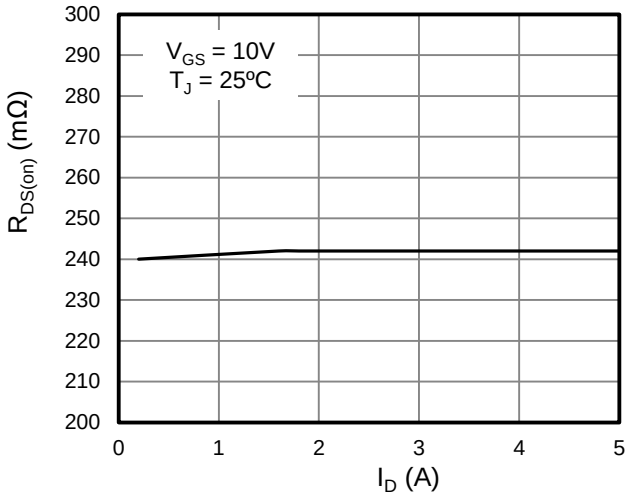


Figure 3: On-Resistance vs. Drain Current

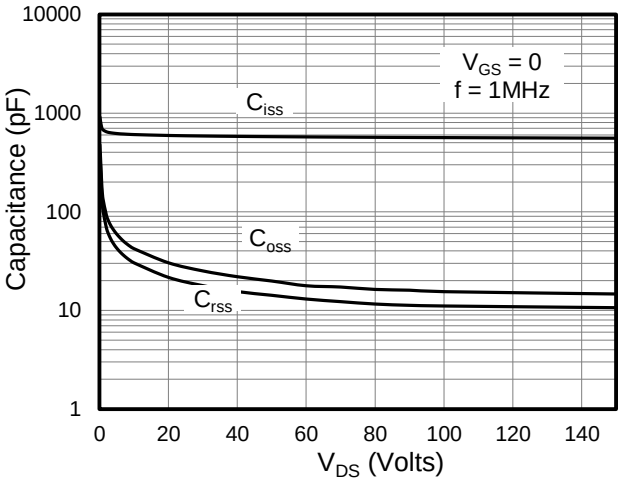


Figure 4: Capacitance Characteristics

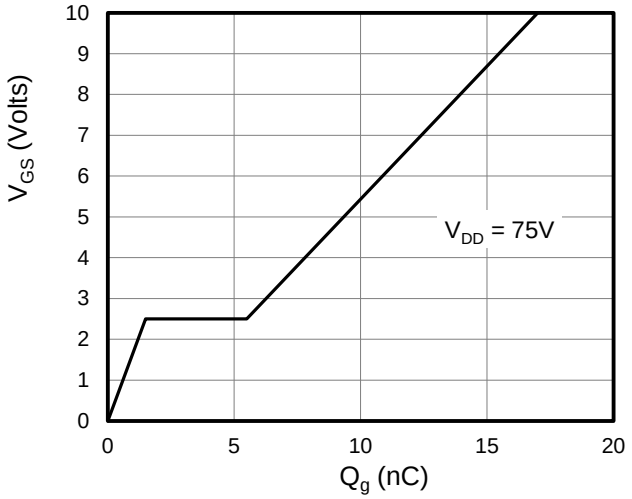


Figure 5: Gate Charge Characteristics

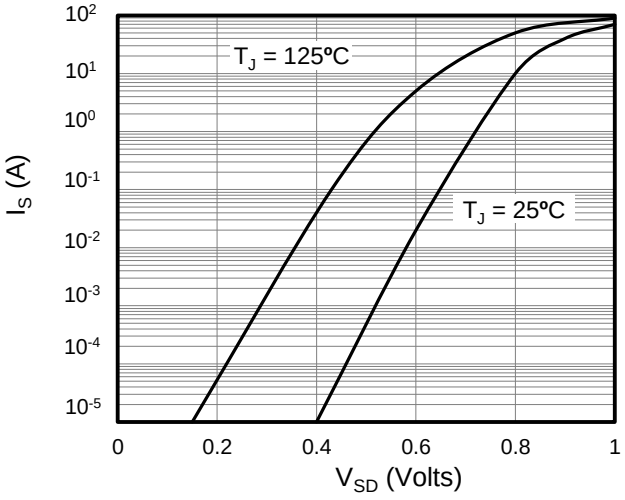


Figure 6: Body Diode Forward Voltage

Typical Characteristics T_J = 25ºC, unless otherwise noted

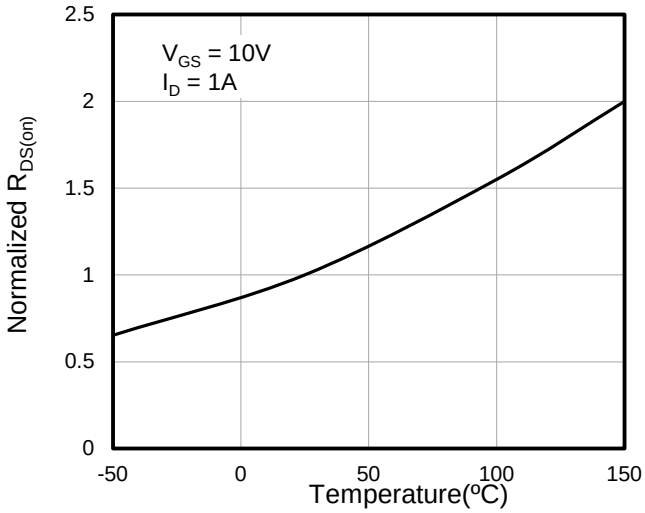


Figure 7: On-Resistance vs. Junction Temperature

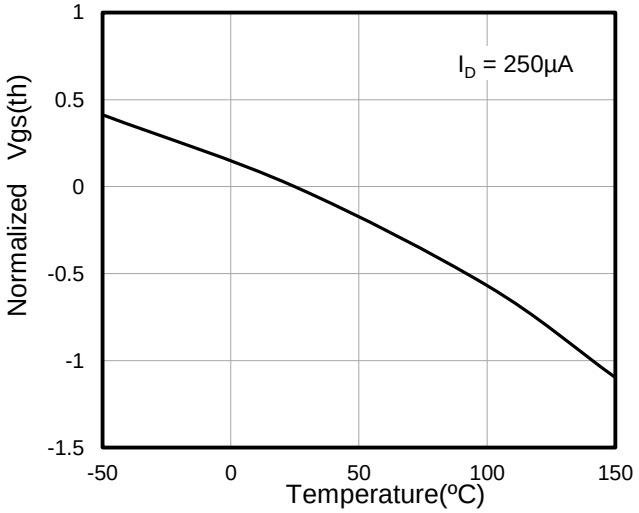


Figure 8: Vgs(th) vs. Junction Temperature

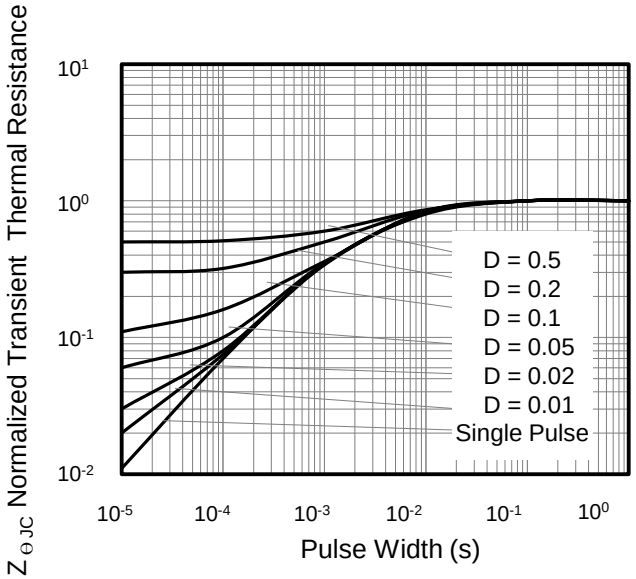


Figure 9: Normalized Transient Thermal Resistance

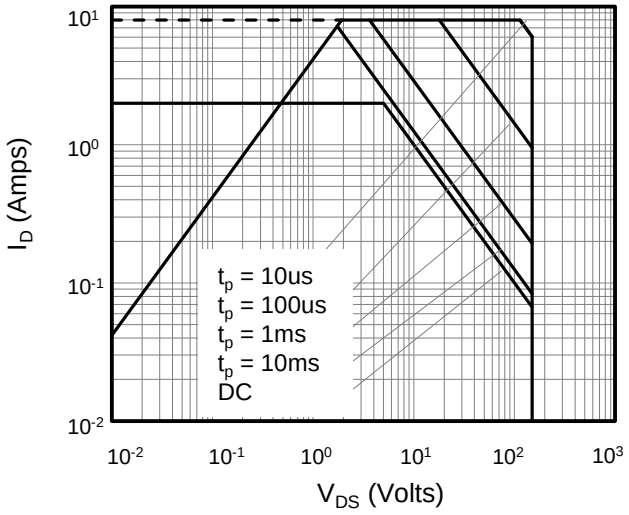


Figure 10: Safe Operating Area

Figure A：Gate Charge Test Circuit and Waveform

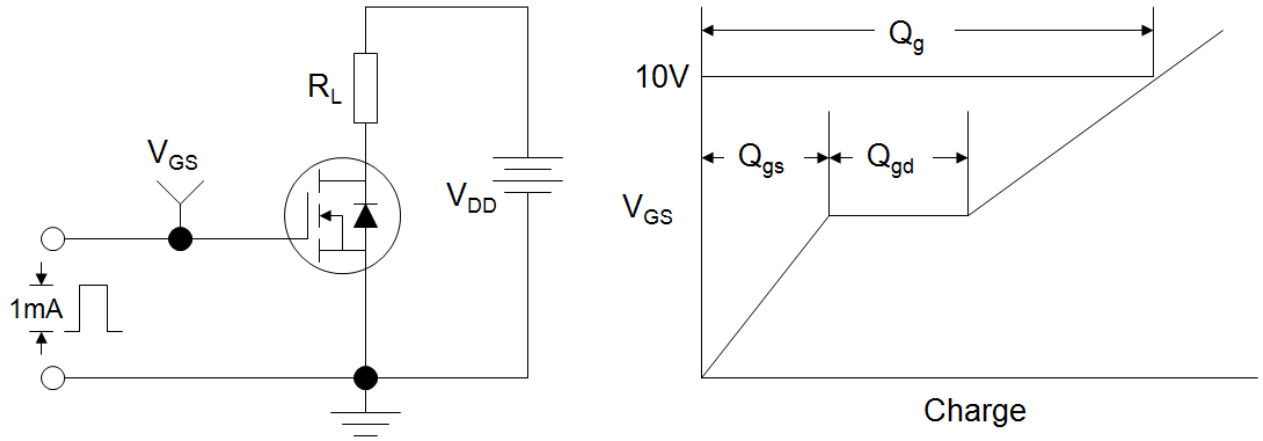


Figure B：Resistive Switching Test Circuit and Waveform

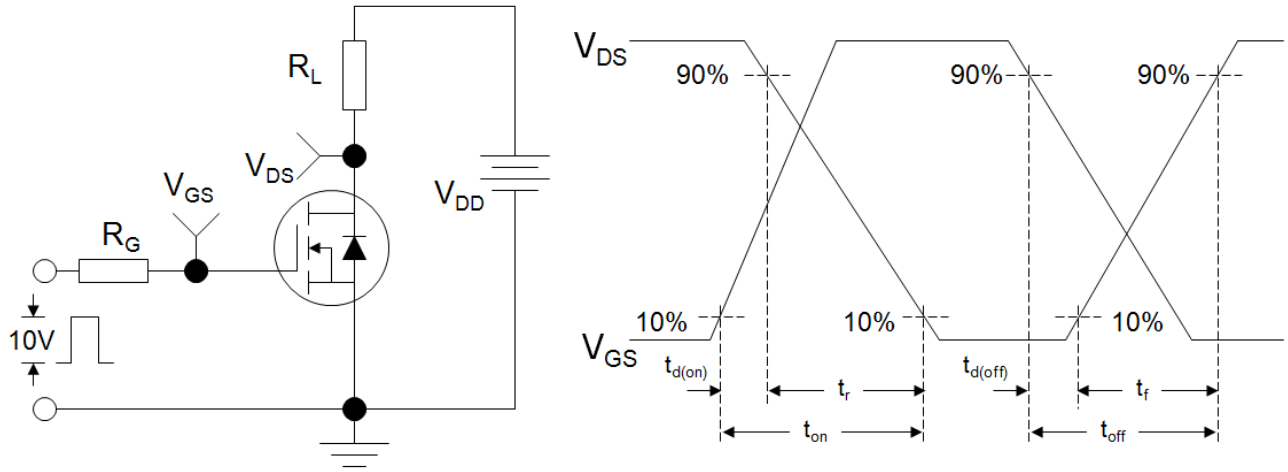
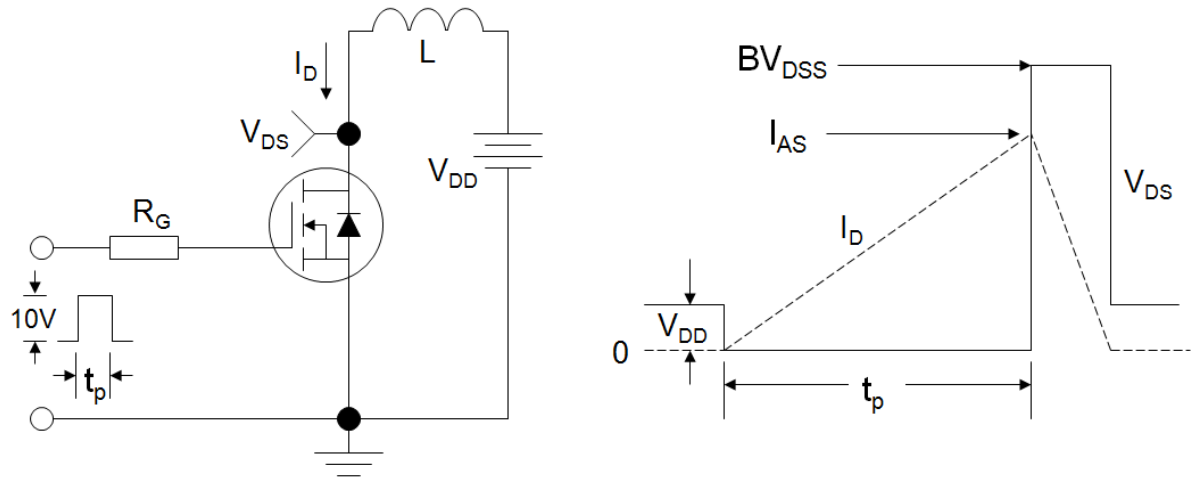
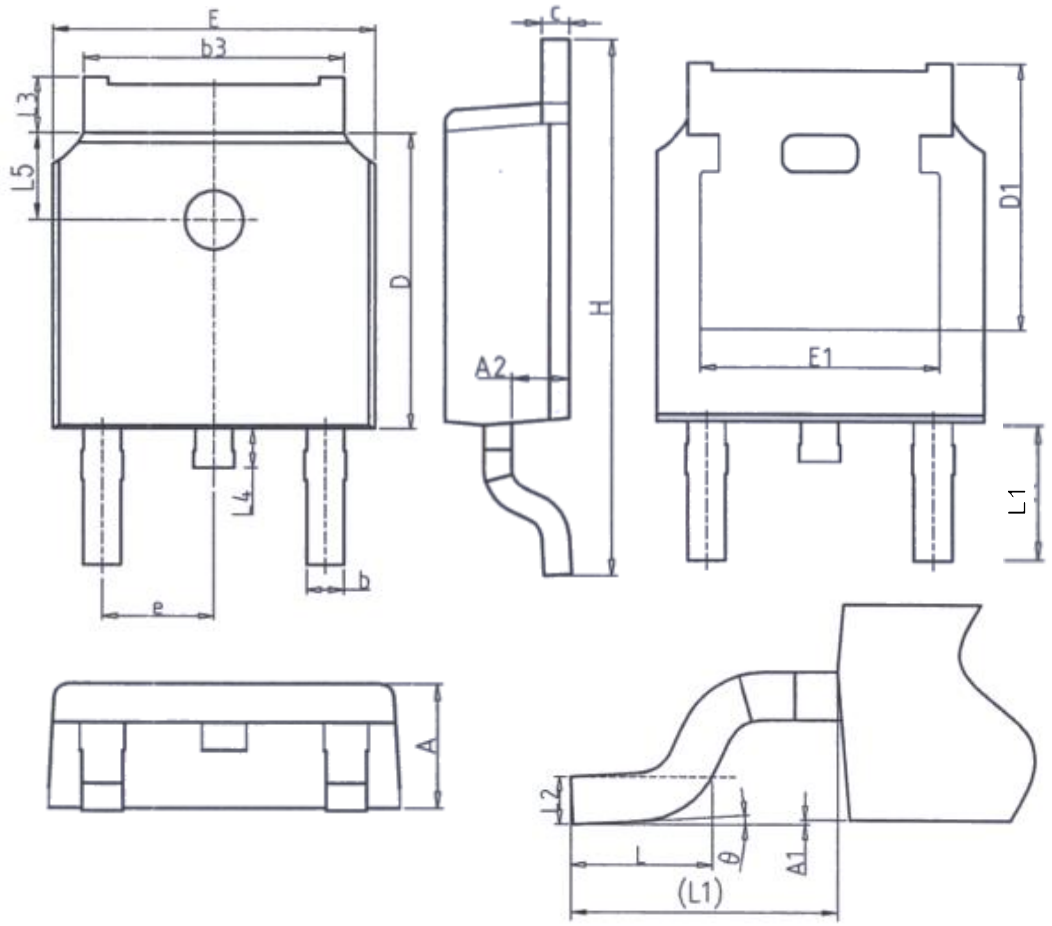


Figure C：Unclamped Inductive Switching Test Circuit and Waveform



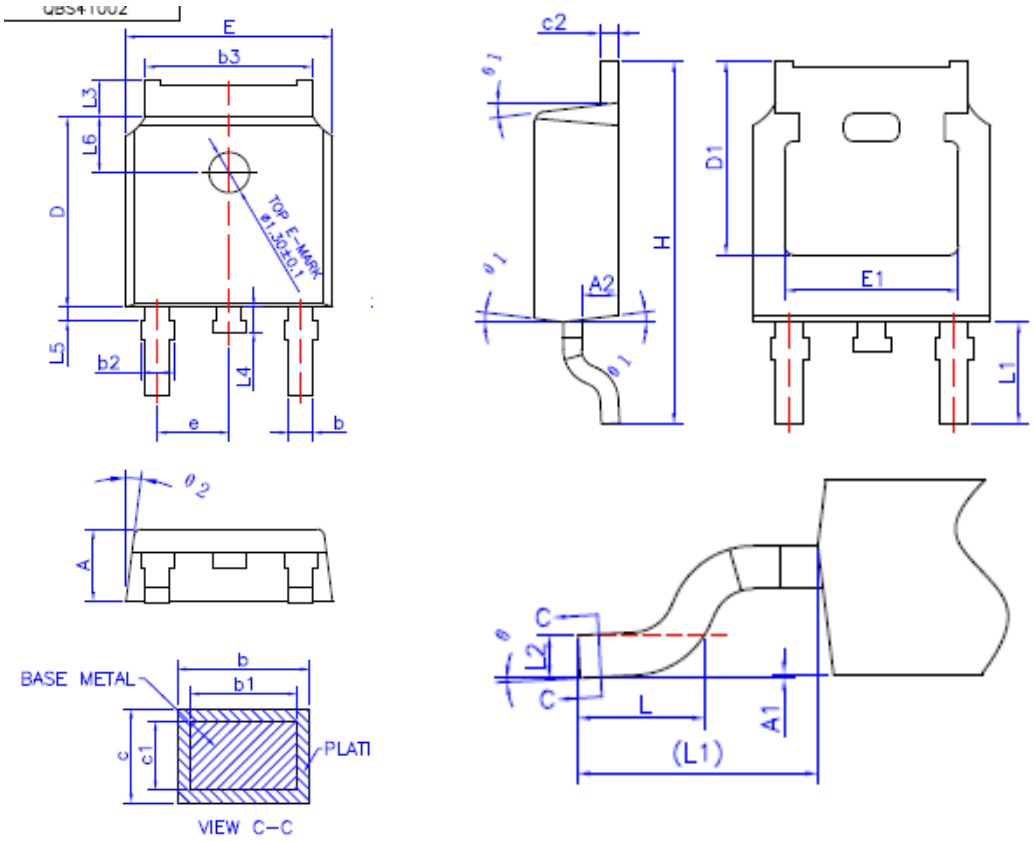
TO-252(华天)



Unit：mm			
Symbol	Min	Nom	Max
A	2.20	2.30	2.38
A1	0.00	-	0.10
A2	0.90	1.01	1.10
b	0.72	-	0.85
b3	5.13	5.33	5.46
c	0.47	-	0.60
D	6.00	6.10	6.20
D1		5.25 REF	
E	6.50	6.60	6.70
E1	4.70	-	-

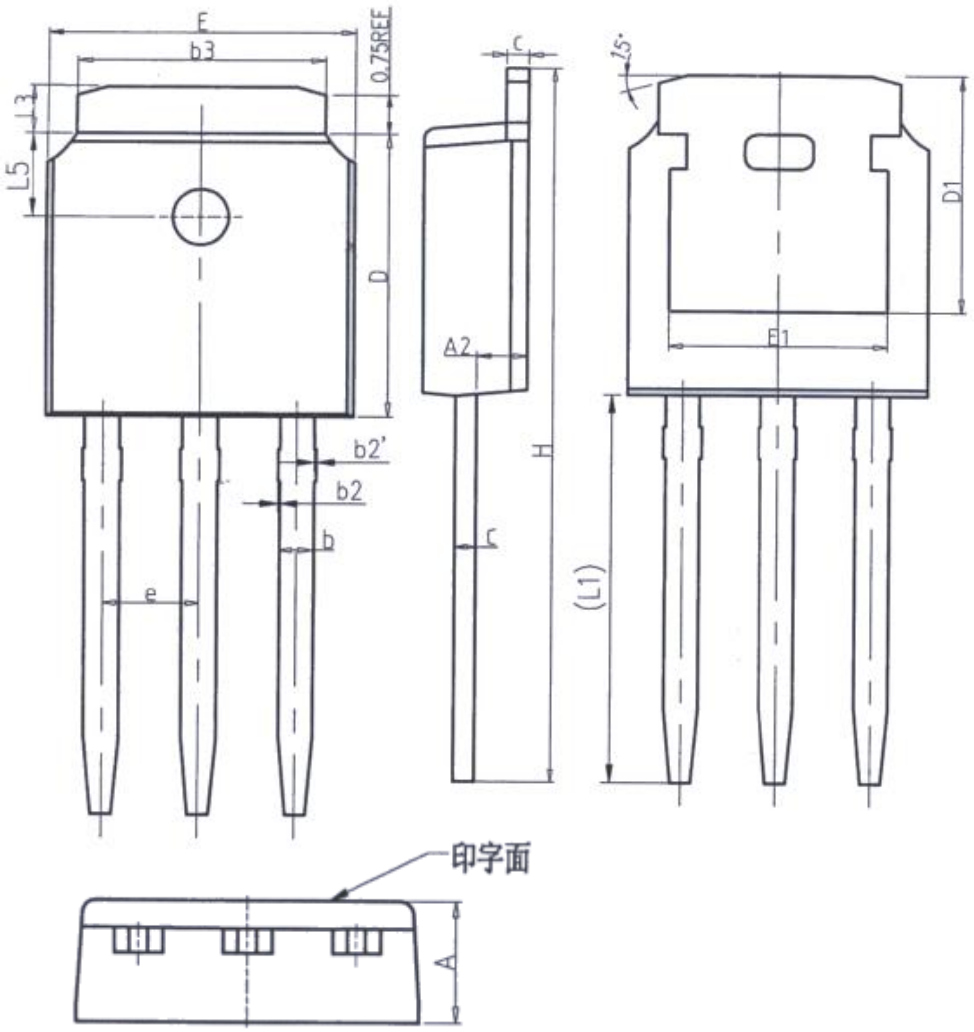
Unit：mm			
Symbol	Min	Nom	Max
e		2.286BSC	
H	9.80	10.10	10.40
L	1.40	1.50	1.70
L1		2.90REF	
L2		0.508BSC	
L3	0.90	-	1.25
L4	0.60	0.80	1.00
L5		1.8 REF	
θ	0°	-	8°

TO-252(集佳)



SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0	—	0.10
A2	0.90	1.01	1.10
b	0.72	—	0.85
b1	0.71	0.76	0.81
b2	0.72	—	0.90
b3	5.13	5.33	5.46
c	0.47	—	0.60
c1	0.46	0.51	0.56
c2	0.47	—	0.60
D	6.00	6.10	6.20
D1	5.25	—	—
E	6.50	6.60	6.70
E1	4.70	—	—
e	2.186	2.286	2.386
H	9.80	10.10	10.40
L	1.40	1.50	1.70
L1	2.90 REF		
L2	0.508 BSC		
L3	0.90	—	1.25
L4	0.60	0.80	1.00
L5	0.15	—	0.75
L6	1.80 REF		
θ	0°	—	8°
θ1	5°	7°	9°
θ2	5°	7°	9°

TO-251(华天)



Unit:mm			
Symbol	Min.	Nom	Max.
A	2.20	2.30	2.38
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b2	0.00	0.04	0.10
b2′	0.00	0.04	0.10
b3	5.20	5.33	5.46
c	0.43	0.53	0.61
D	5.98	6.10	6.22

Unit:mm			
Symbol	Min.	Nom	Max.
D1	5.30 REF		
E	6.40	6.60	6.73
E1	4.63	-	-
e	2.286 BSC		
H	16.22	16.52	16.82
L1	9.15	9.40	9.65
L3	0.88	1.02	1.28
L5	1.65	1.80	1.95

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