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

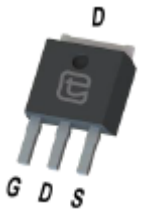
Product Summary

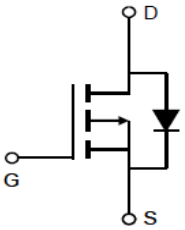
V_{DS}	-30V
I_D (at V_{GS}=-10V)	-5A
$R_{DS(ON)}$ (at V_{GS}=-10V)	< 0.15Ω
$R_{DS(ON)}$ (at V_{GS}=-4.5V)	< 0.24Ω

100% UIS Tested

RoHS

TO-251-SL





Part Number	Package Type	Form	Marking
TTU05P03ATS	TO-251-SL	Tube	05P03AT

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	-1	A
	T_C =100°C		-1	
Pulsed Drain Current [A]		I_{DM}	-3	A
Avalanche Current [A]		I_{AS}	-6	A
Single Pulse Avalanche Energy L =0.3mH [A]		E_{AS}	5.4	mJ
Power Dissipation [C]	T_C =25°C	P_D	10	W
	T_C =100°C		5	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	$R_{\theta JC}$	15	°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 =-1A			120	150	mΩ
		V_{GS} =-4.5V, I_D =-1A			190	240	mΩ
g_{FS}	Forward Transconductance	V_{DS} =-5V, I_D =-1A			17		S
V_{SD}	Diode Forward Voltage	I_S =-15A, V_{GS} =0V				-1	V
I_S	Maximum Body-Diode Continuous Current [B]					-5	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS} =0V, V_{DS} =-15V, f =1MH_Z			266		pF
C_{oss}	Output Capacitance				36		
C_{rss}	Reverse Transfer Capacitance				11		
SWITCHING PARAMETERS							
Q_g(10V)	Total Gate Charge	V_{GS} =-10V,V_{DS} =-15V, I_D =-1A			30		nC
Q_{gs}	Gate Source Charge				4.6		
Q_{gd}	Gate Drain Charge				10		
$t_{D(on)}$	Turn-On Delay Time	V_{GS} =-10V,V_{DS} =-15V, I_D =-1A, R_G =2.5Ω			11		ns
t_r	Turn-On Rise Time				10		
$T_{D(off)}$	Turn-Off Delay Time				24		
t_f	Turn-Off Fall Time				12		
t_{rr}	Body Diode Reverse Recovery Time	I_F =-1A, di/dt =100A/μs			30		ns
Q_{rr}	Body Diode Reverse Recovery Charge				22		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

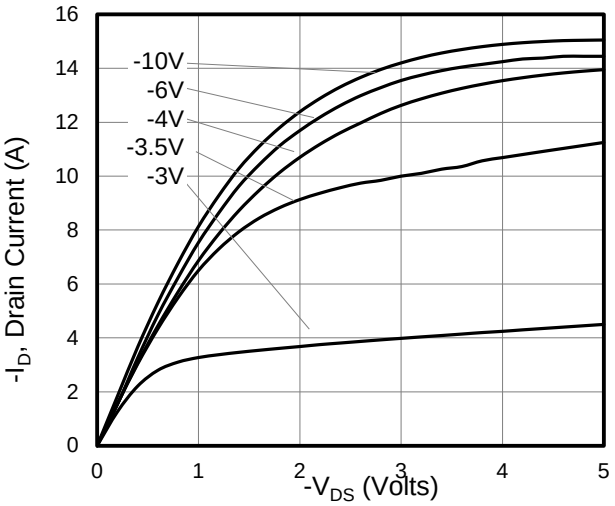


Figure 1: On-Region Characteristics

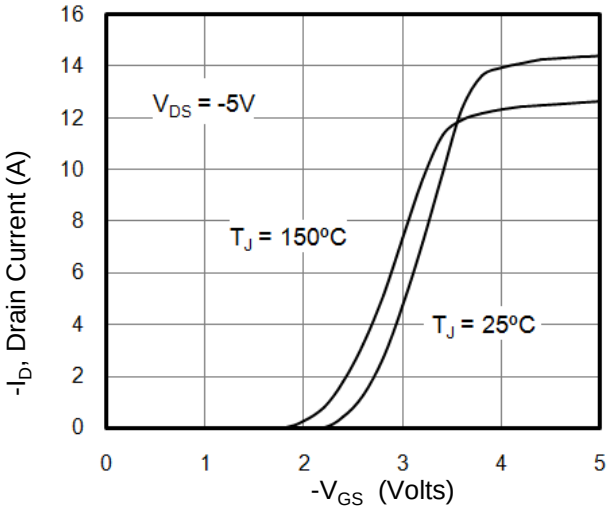


Figure 2: Transfer Characteristics

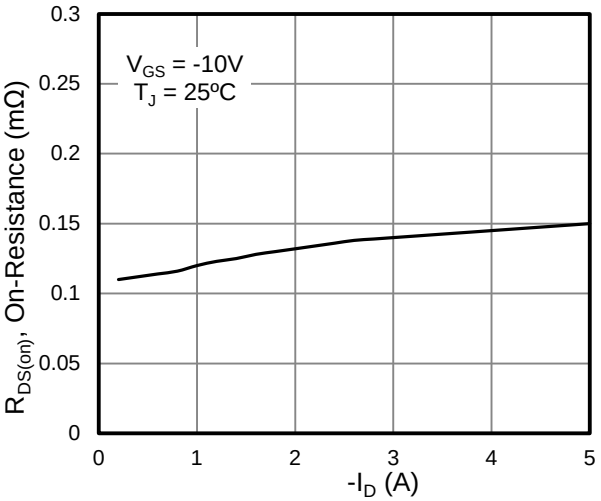


Figure 3: On-Resistance vs. Drain Current

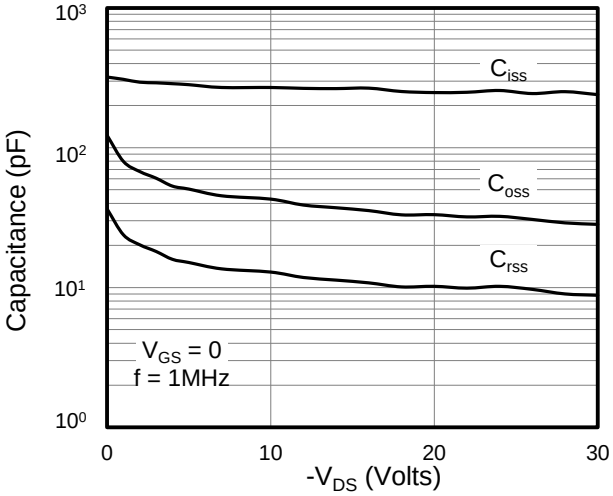


Figure 4: Capacitance Characteristics

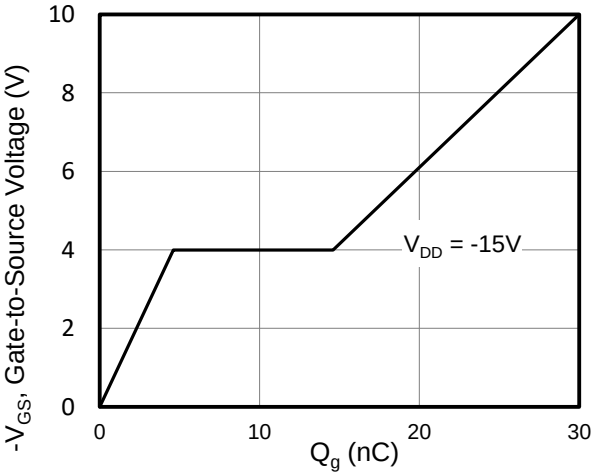


Figure 5: Gate Charge Characteristics

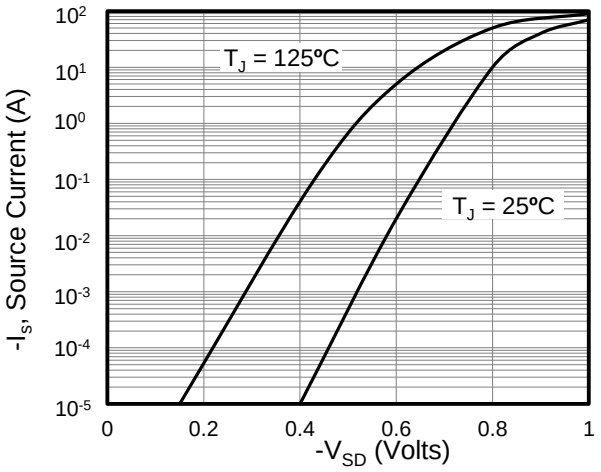


Figure 6: Body Diode Forward Voltage

Typical Characteristics T_J = 25ºC, unless otherwise noted

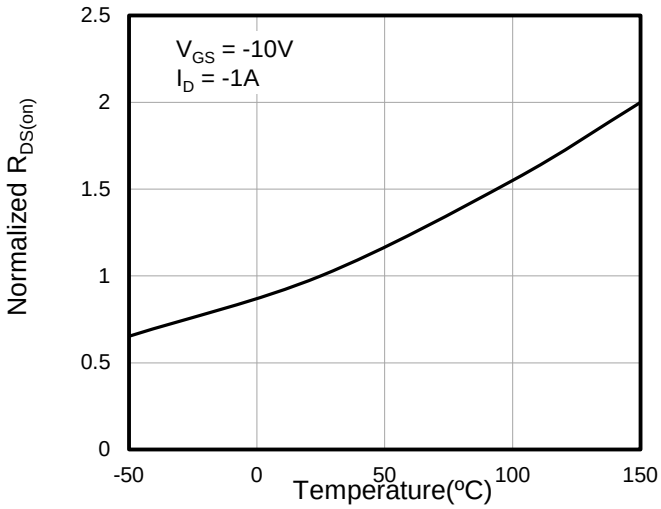


Figure 7: On-Resistance vs. Junction Temperature

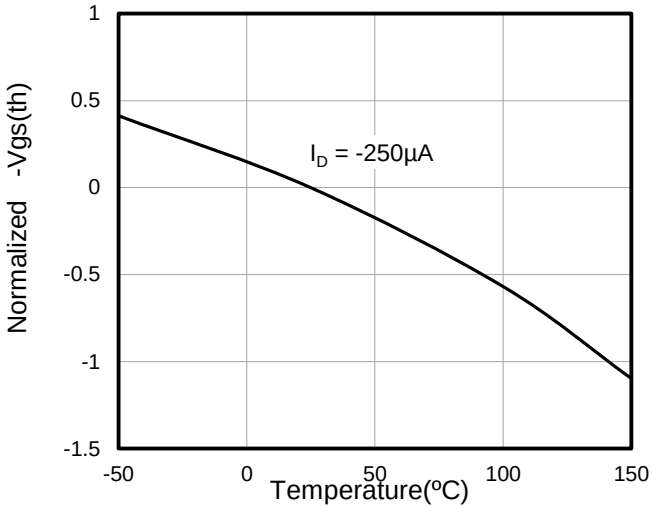


Figure 8: Vgs(th) vs. Junction Temperature

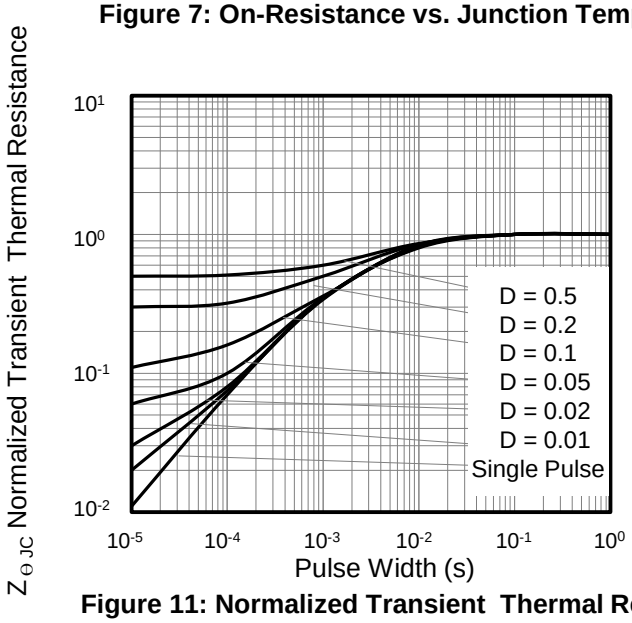


Figure 11: Normalized Transient Thermal Resistance

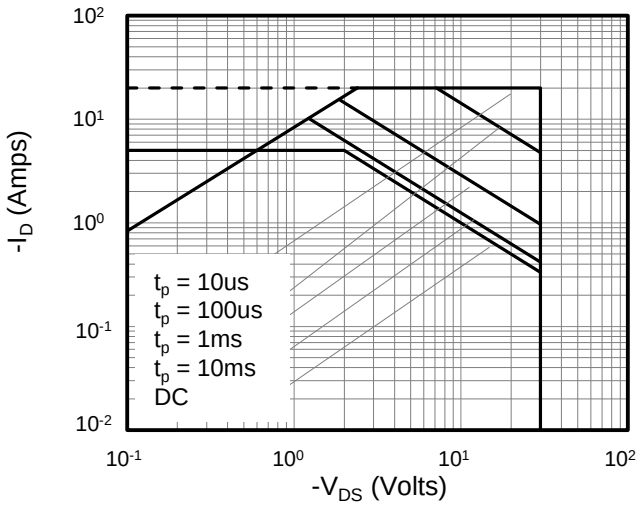


Figure 12: Safe Operating Area

Figure A：Gate Charge Test Circuit and Waveform

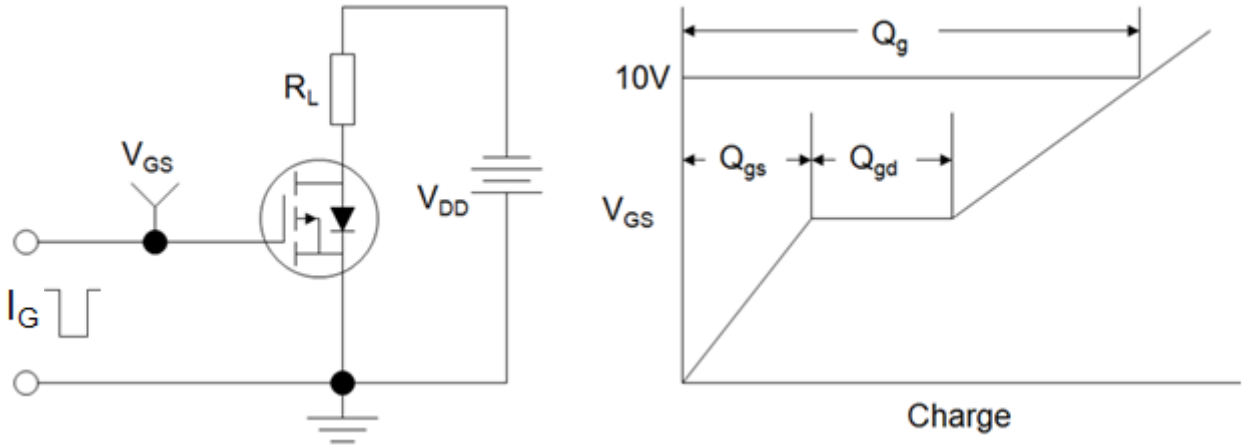


Figure B：Resistive Switching Test Circuit and Waveform

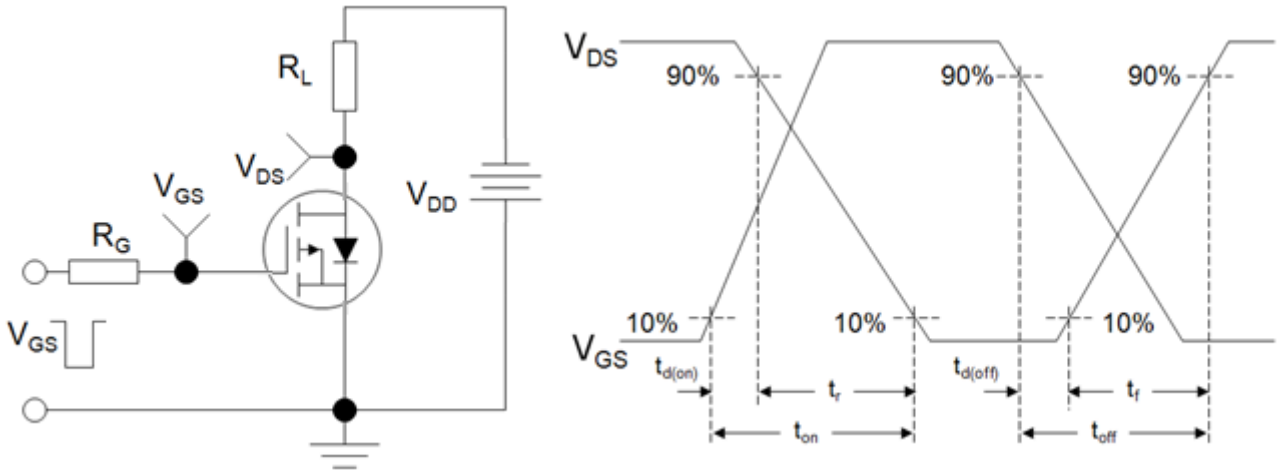
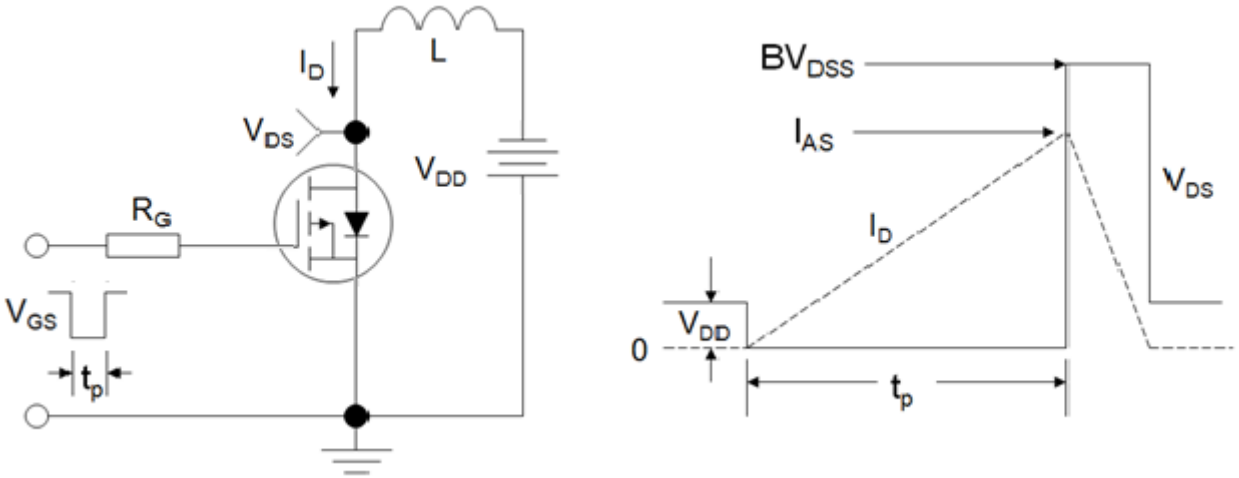


Figure C：Unclamped Inductive Switching Test Circuit and Waveform



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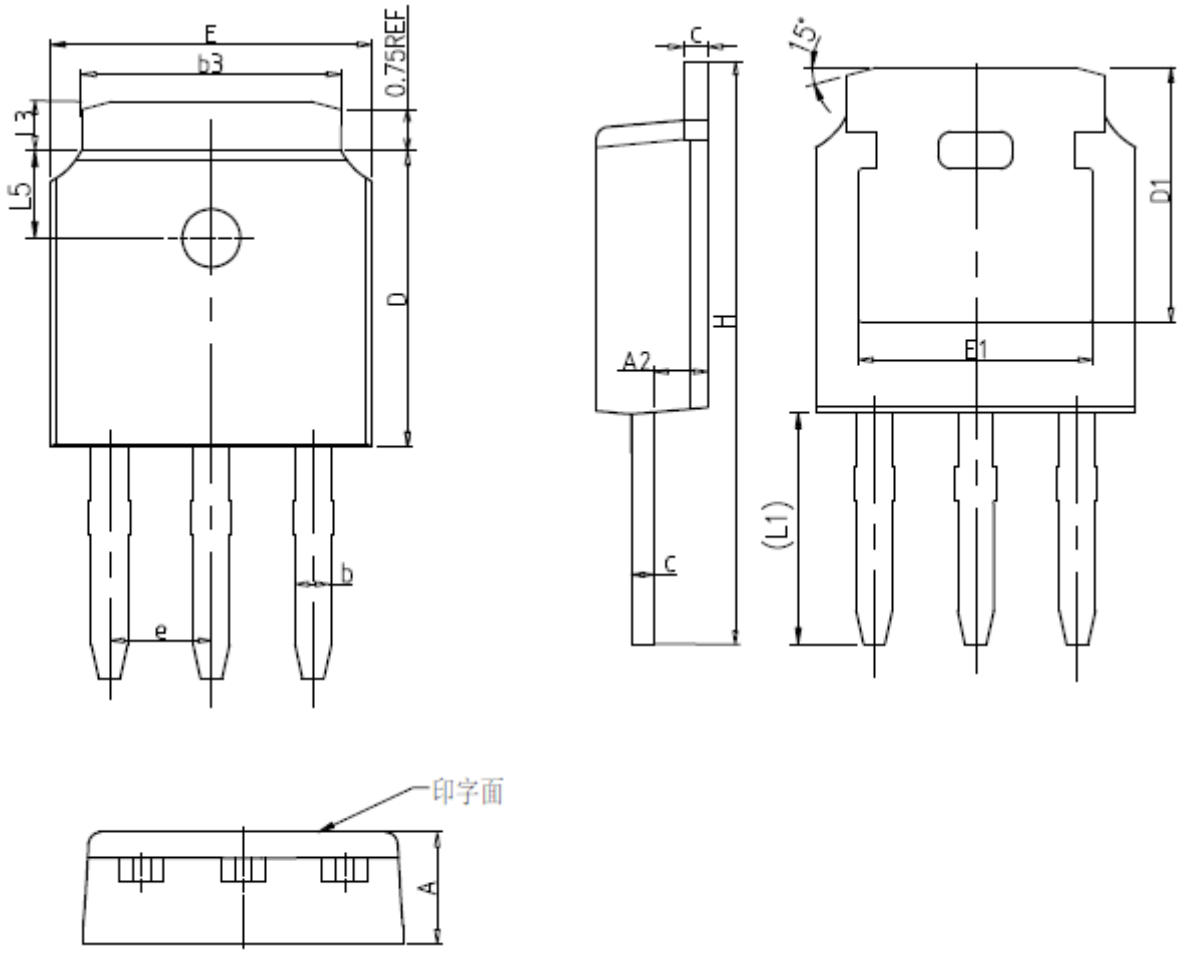

SYMBOL	MM		
	MIN	NOM	MAX
A	2.20	2.30	2.38
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b3	5.20	5.33	5.46
c	0.43	0.53	0.61
D	5.98	6.10	6.22
D1	5.30REF		
E	6.40	6.60	6.73
E1	4.63	-	-
e	2.286BSC		
H	10.00	11.22	11.44
L1	3.90	4.10	4.30
L3	0.88	1.02	1.28
L5	1.65	1.80	1.95

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