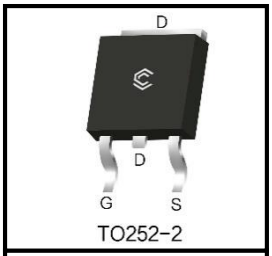
650V Super-Junction Power MOSFET

FEATURES

- Very low FOM $R_{DS(on)} \times Q_g$
- 100% avalanche tested
- RoHS compliant

APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)



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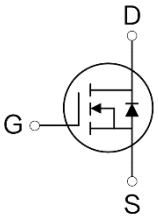


RoHS

Device Marking and Package Information

Device	Package	Marking
CLD65R280R	TO252-2	CLD65R280R

Absolute Maximum Ratings at T_c= 25℃ unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage (V_{GS} = 0V)	V_{DSS}	650	V
Continuous Drain Current	I_D	15	A
Continuous Drain Current T_C = 100℃		9	
Pulsed Drain Current (note1)	I_{DM}	45	A
Gate-Source Voltage	V_{GSS}	± 30	V
Single Pulse Avalanche Energy (note2)	E_{AS}	80	mJ
Avalanche Current (note1)	I_{AS}	4	A
Repetitive Avalanche Energy (note1)	E_{AR}	0.32	mJ
Power Dissipation	P_D	132	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150	℃

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-Case	$R_{\theta JC}$	0.93	℃/W
Thermal Resistance, Junction-Ambient	$R_{\theta JA}$	106	

Electrical Characteristics T_j= 25℃ unless otherwise specified						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	650	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 650V, V_{GS} = 0V, T_J = 25℃	--	--	1	uA
		V_{DS} = 650V, V_{GS} = 0V, T_J = 150℃	--	--	100	
Gate-Source Leakage	I_{GSS}	V_{GS} = ±30V	--	--	±100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	2.5	--	4.0	V
Drain-Source On-Resistance (note3)	$R_{DS(on)}$	V_{GS} = 10V, I_D = 7.5A	--	0.24	0.28	Ω
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 100V, f = 100kHz	--	1126	--	pF
Output Capacitance	C_{oss}		--	41	--	
Reverse Transfer Capacitance	C_{rss}		--	0.79	--	
Gate Resistance	R_g	V_{GS} = 0V, f = 1.0MHz	--	3.9	--	Ω
Total Gate Charge	Q_g	V_{DD} = 520V, I_D = 7.5A, V_{GS} = 10V	--	26	--	nC
Gate-Source Charge	Q_{gs}		--	3.6	--	
Gate-Drain Charge	Q_{gd}		--	10.5	--	
Gate Plateau Voltage	$V_{GS(pl)}$		--	5.5	--	V
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 400V, I_D = 7.5A, R_G = 25Ω	--	20	--	ns
Turn-on Rise Time	t_r		--	40	--	
Turn-off Delay Time	$t_{d(off)}$		--	95	--	
Turn-off Fall Time	t_f		--	43	--	
Body Diode Characteristics						
Continuous Body Diode Current	I_S	T_C = 25℃	--	--	15	A
Pulsed Diode Forward Current	I_{SM}		--	--	45	
Body Diode Voltage	V_{SD}	T_J = 25℃, I_{SD} = 7.5A, V_{GS} = 0V	--	0.85	1.2	V
Reverse Recovery Time	t_{rr}	V_R = 300V, I_F =7.5A, di_F/dt = 100A/μs	--	260	--	ns
Reverse Recovery Charge	Q_{rr}		--	2.95	--	μC
Peak Reverse Recovery Current	I_{rrm}		--	21	--	A

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. I_{AS} =4 A, V_{DD} = 50V, R_G = 25Ω,L=10mH, Starting T_J = 25℃
3. Pulse Test: Pulse width ≤ 300 μs, Duty Cycle ≤ 1%

Typical Characteristics T_J = 25℃, unless otherwise noted

Figure 1. Output Characteristics

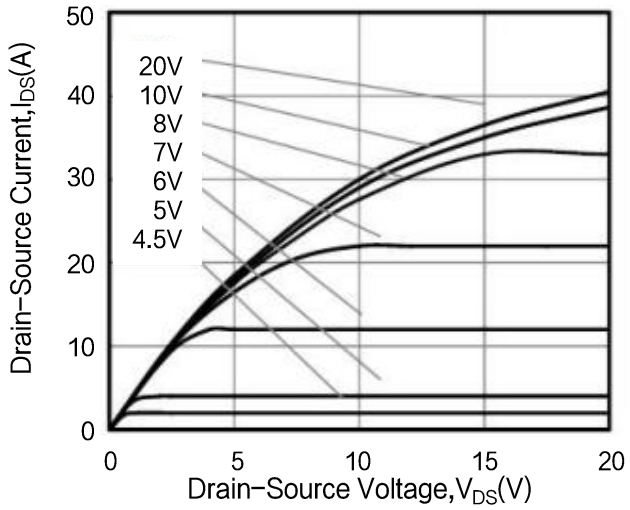


Figure 2. Transfer Characteristics

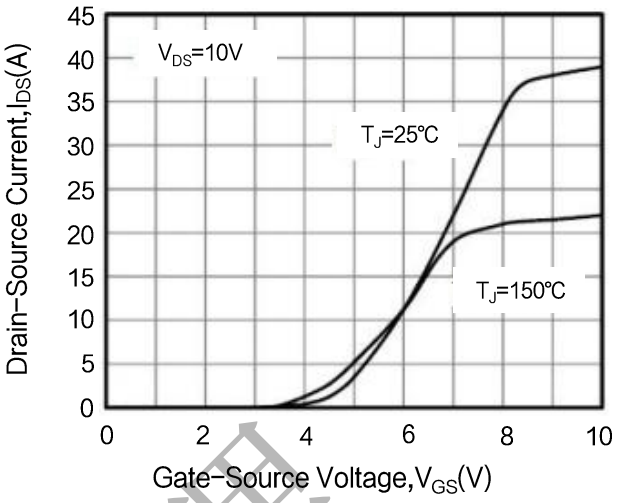


Figure 3. On-Resistance vs. Drain Current

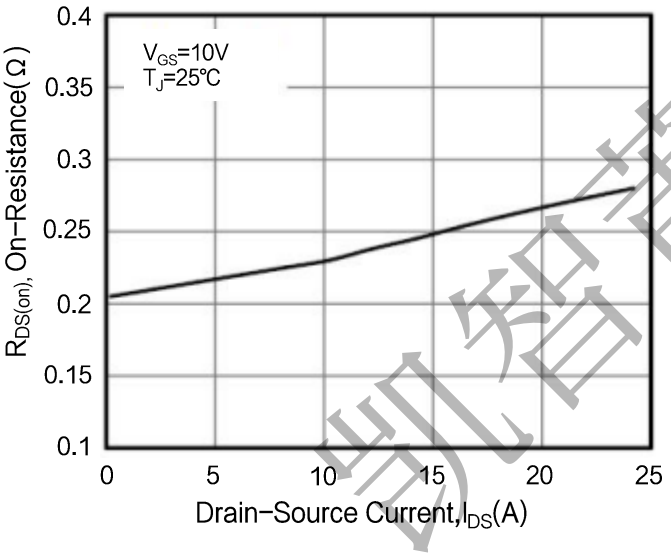


Figure 4. Capacitance

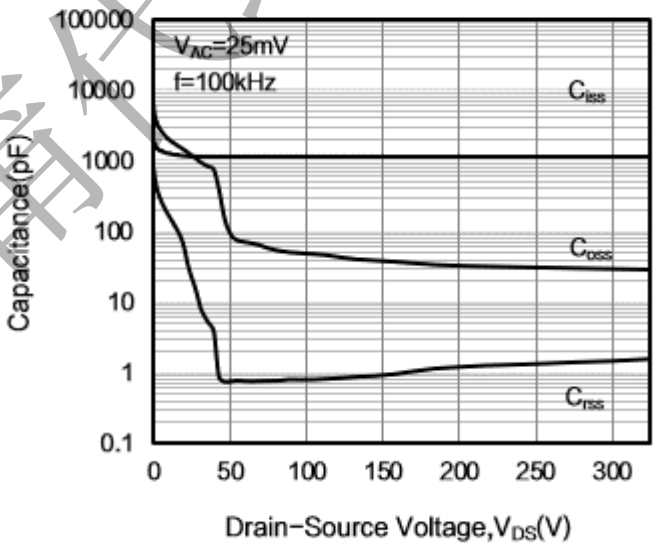


Figure 5. Gate Charge Characteristics

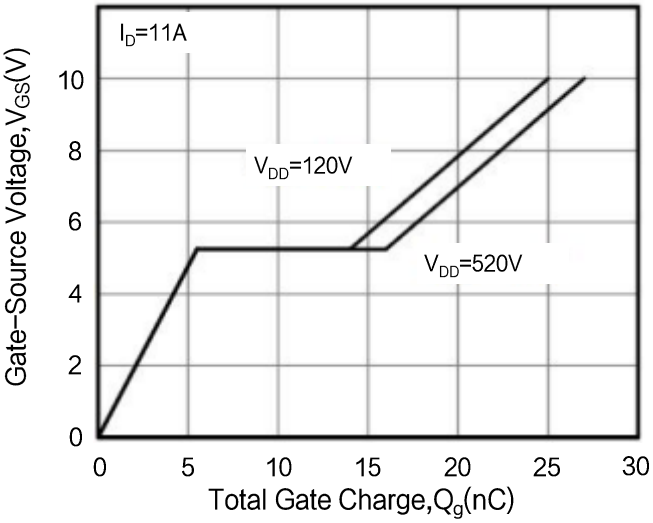
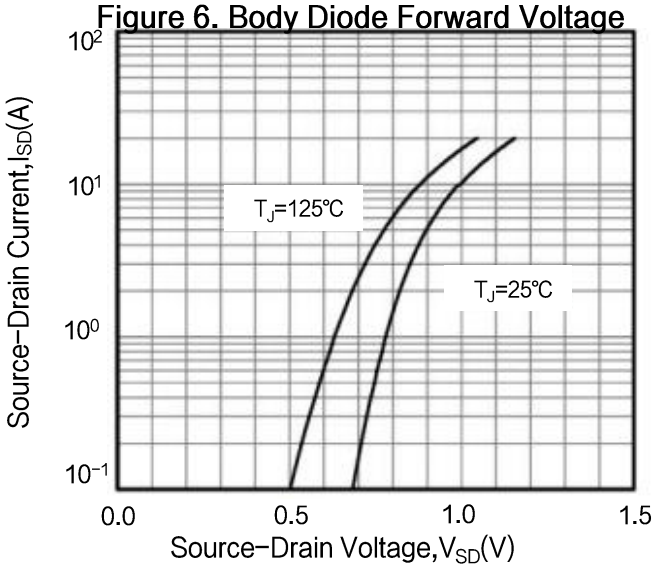


Figure 6. Body Diode Forward Voltage



Typical Characteristics T_J = 25℃, unless otherwise noted

Fig.7 Normalized On-Resistance vs. Temperature

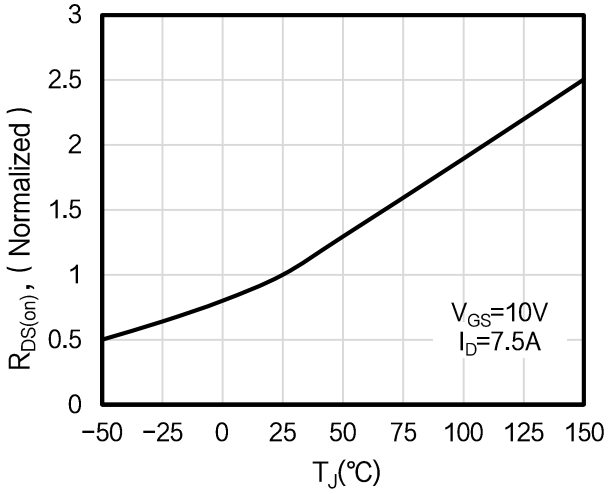


Fig.8 Normalized Threshold Voltage vs. Temperature

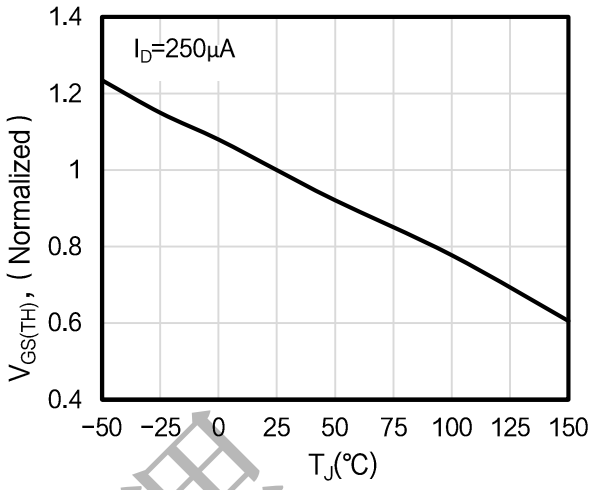


Figure 9. Transient Thermal Impedance

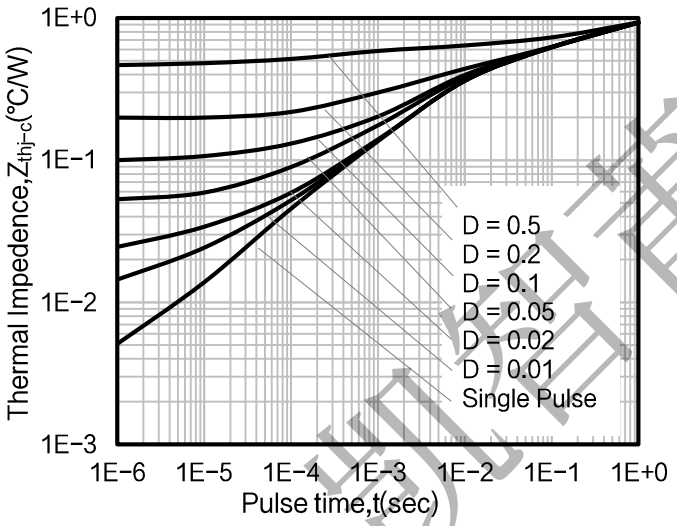


Figure 10. Safe Operation Area

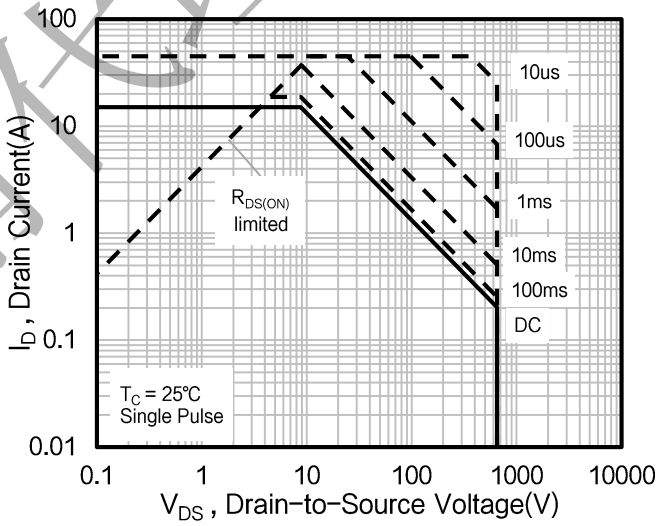


Figure A：Gate Charge Test Circuit and Waveform

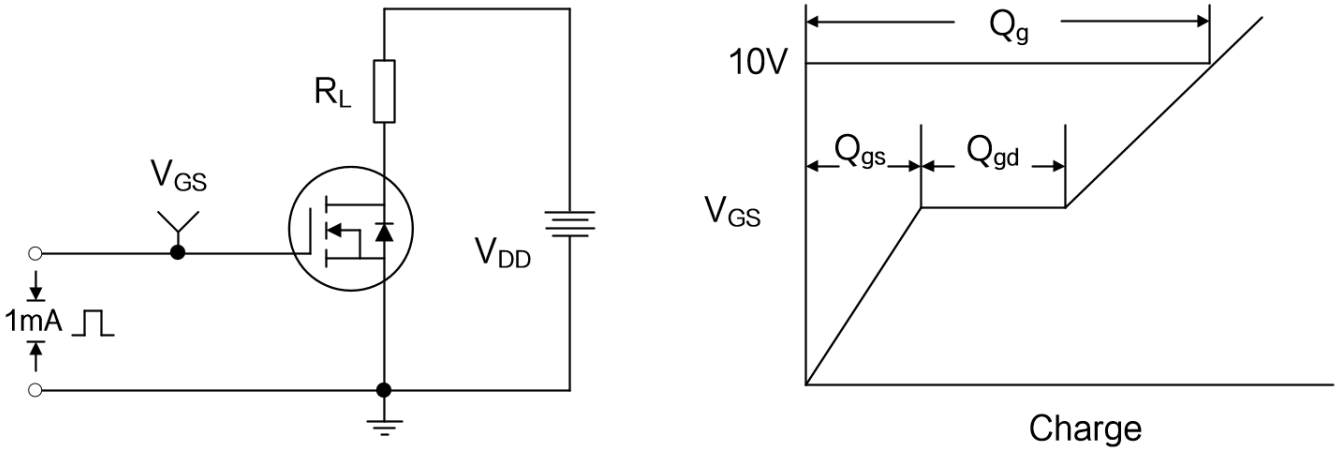


Figure B：Resistive Switching Test Circuit and Waveform

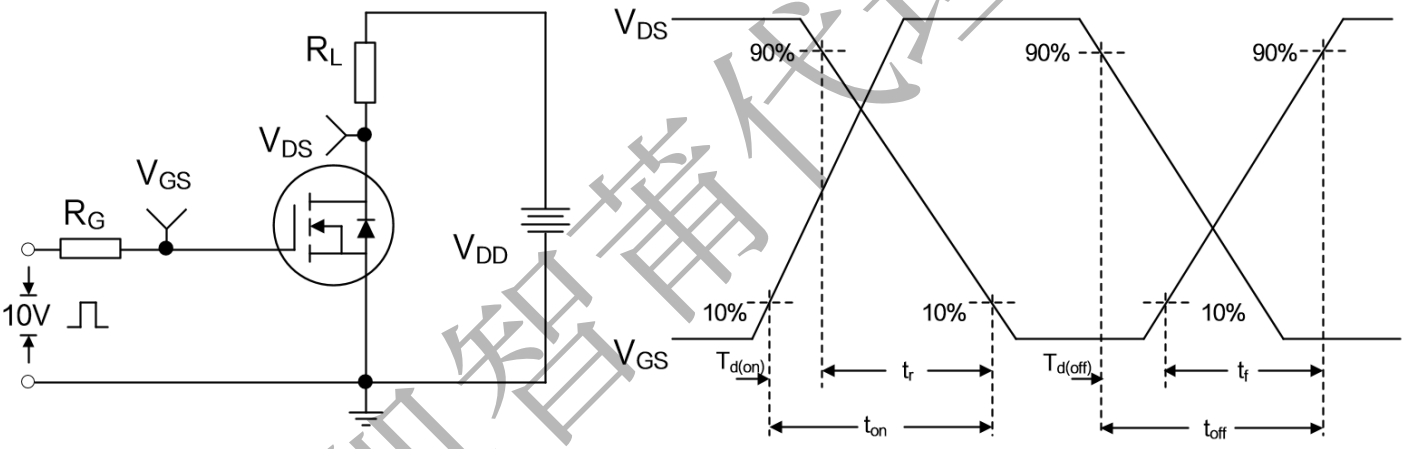
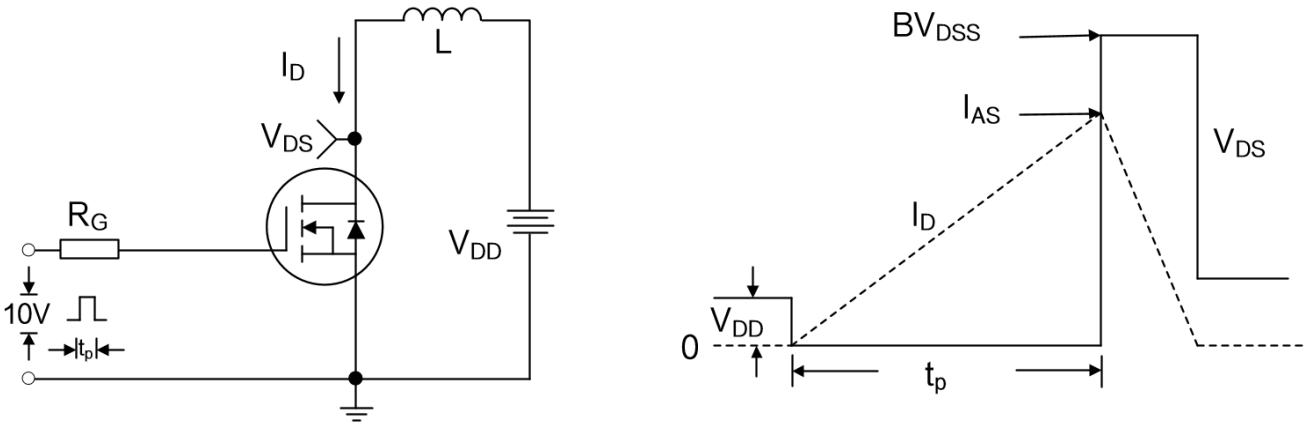


Figure C：Unclamped Inductive Switching Test Circuit and Waveform



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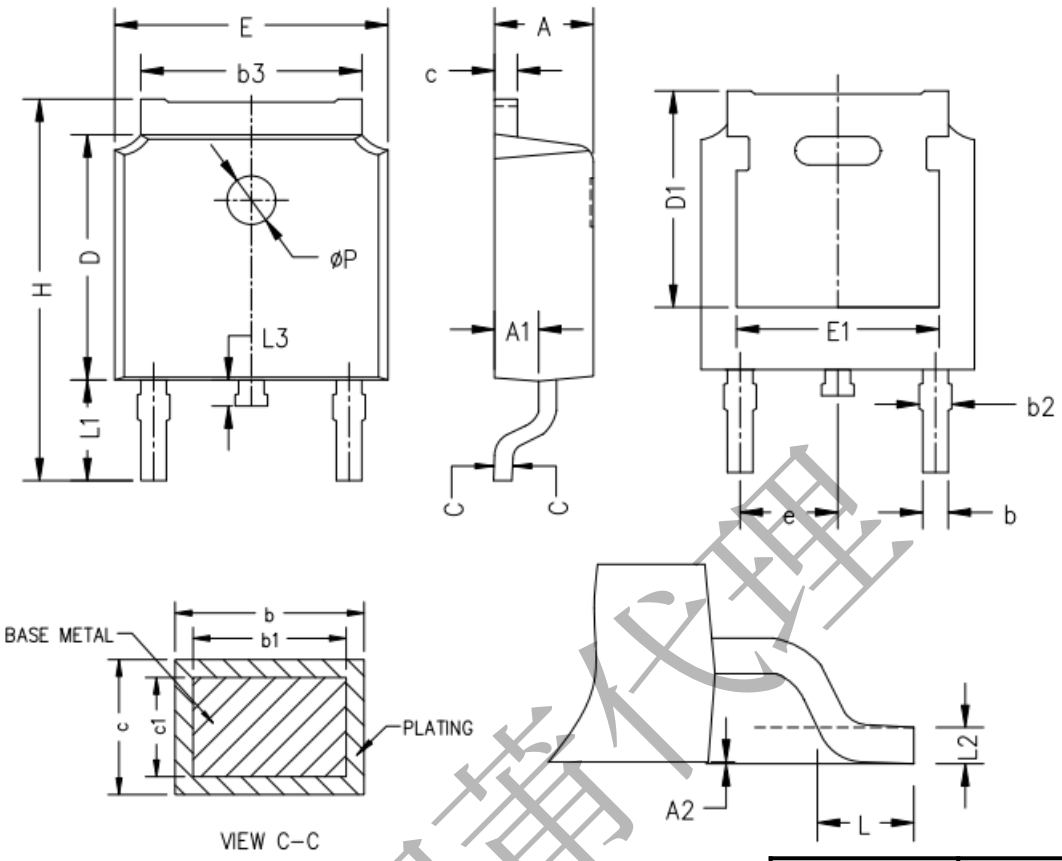

SYMBOLS	MILLIMETERS	
	MIN	MAX
A	2.15	2.45
A1	0.90	1.12
A2	0	0.20
b	0.66	0.87
b1	0.71	0.81
b2	0.72	1.23
b3	5.12	5.52
c	0.40	0.61
c1	0.46	0.56
D	5.95	6.25
D1	5.25	6.25
e	2.286BSC	
E	6.45	6.75
E1	4.70	--
H	9.77	10.40
L	1.40	1.70
L1	2.90REF	
L2	0.508REF	
L3	0.60	1.00
ΦP	1.10	1.40

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