

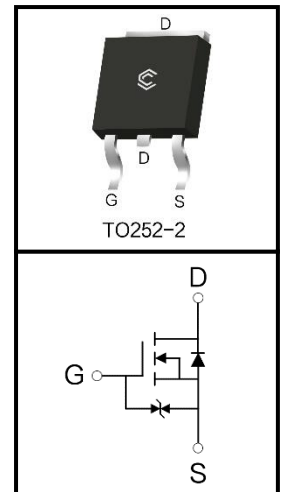
650V Super-Junction Power MOSFET

FEATURES

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

APPLICATIONS

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



Device Marking and Package Information

Device	Package	Marking
CL3D65R270M	TO252-2	CL3D65R270M

Absolute Maximum Ratings at $T_c = 25^\circ\text{C}$ 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 $T_c = 100^\circ\text{C}$		9	
Pulsed Drain Current (note1)	I_{DM}	45	A
Gate-Source Voltage	V_{GSS}	± 20	V
Single Pulse Avalanche Energy (note2)	E_{AS}	20	mJ
Repetitive Avalanche Energy (note1)	E_{AR}	0.08	mJ
Power Dissipation	P_D	60	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	$-55 \sim +150$	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-Case	$R_{\theta JC}$	2.08	$^\circ\text{C/W}$
Thermal Resistance, Junction-Ambient	$R_{\theta JA}$	62.5	

Electrical Characteristics $T_J = 25^{\circ}\text{C}$ 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 = 1mA	650	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 650V, V _{GS} = 0V	--	--	1	uA
Gate-Source Leakage	I _{GSS}	V _{GS} = ± 20V	--	--	± 1	uA
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250uA	2.5	3.5	4.5	V
Drain-Source On-Resistance (Note3)	R _{DS(on)}	V _{GS} = 10V, I _D = 7.5A	--	250	280	mΩ
Gate resistance	R _G	f = 1.0MHz open drian	--	10.5	--	Ω
Dynamic						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = 400V, f = 250kHz	--	850	--	pF
Output Capacitance	C _{oss}		--	16	--	
Reverse Transfer Capacitance	C _{rss}		--	1.5	--	
Total Gate Charge	Q _g	V _{DD} = 400V, I _D = 7.5A, V _{GS} = 0~10V	--	21	--	nC
Gate-Source Charge	Q _{gs}		--	4	--	
Gate-Drain Charge	Q _{gd}		--	7	--	
Gate Plateau Voltage	V _{pl}		--	5.6	--	V
Turn-on Delay Time	t _{d(on)}	V _{DD} = 400V, I _D = 7.5A, R _G = 10Ω	--	12.1	--	ns
Turn-on Rise Time	t _r		--	9.6	--	
Turn-off Delay Time	t _{d(off)}		--	36.5	--	
Turn-off Fall Time	t _f		--	10.6	--	
Body Diode Characteristics						
Continuous Body Diode Current	I _S	T _C = 25°C	--	--	15	A
Pulsed Diode Forward Current	I _{SM}		--	--	45	
Body Diode Voltage	V _{SD}	T _J = 25°C, I _{SD} = 7.5A, V _{GS} = 0V	--	0.9	1.2	V
Reverse Recovery Time	t _{rr}	V _R = 400V, I _F = 7.5A, di _F /dt = 100A/μ s	--	267	--	ns
Reverse Recovery Charge	Q _{rr}		--	2.3	--	μ C
Peak Reverse Recovery Current	I _{rrm}		--	15.8	--	A

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $I_{AS} = 1.8A, V_{DD} = 50V, R_G = 25\Omega, L = 10mH$, Starting $T_J = 25^{\circ}\text{C}$
3. Pulse Test: Pulse width $\leq 300 \mu s$, Duty Cycle $\leq 1\%$

Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 1. Typ.Output Characteristics

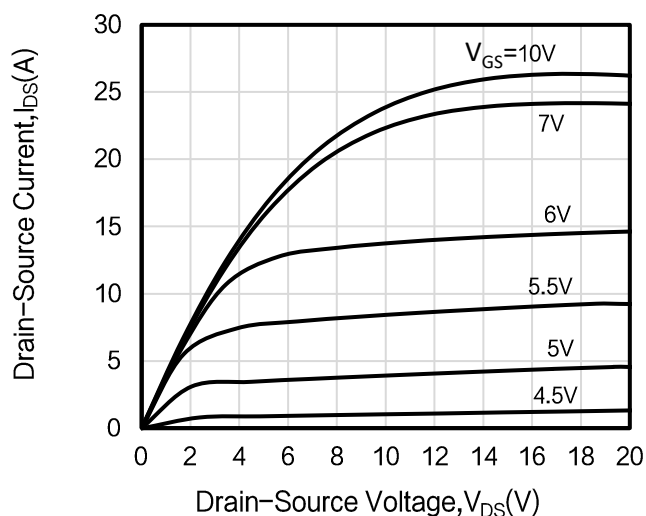


Figure 2. Transfer Characteristics

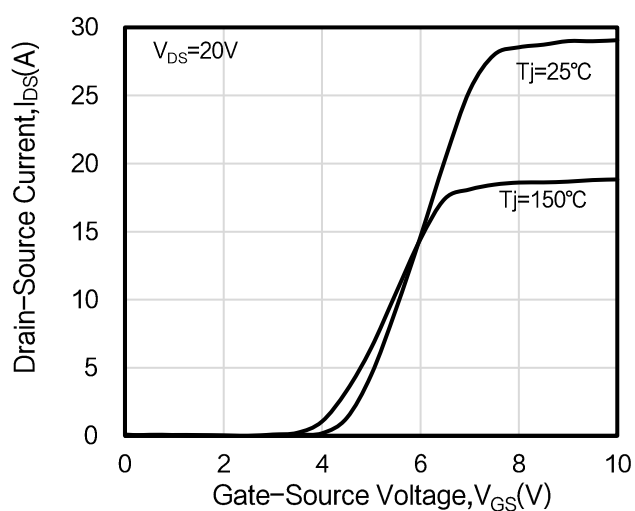


Fig.3 On-Resistance vs.Drain Current

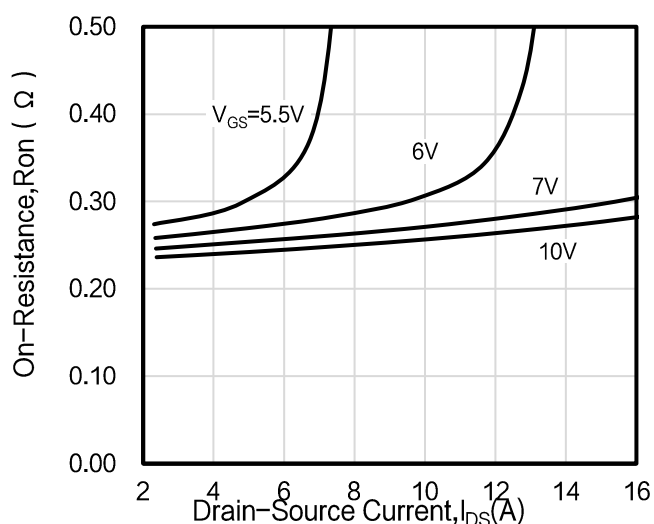


Fig.4 On-Resistance vs. Temperature

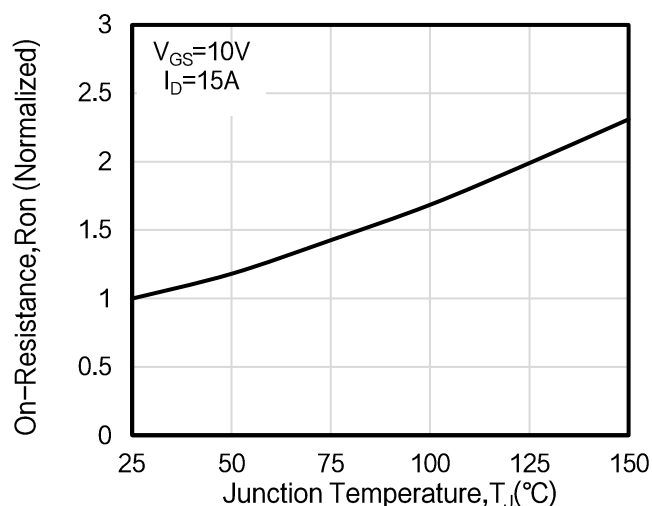


Figure 5. Body Diode Forward Voltage

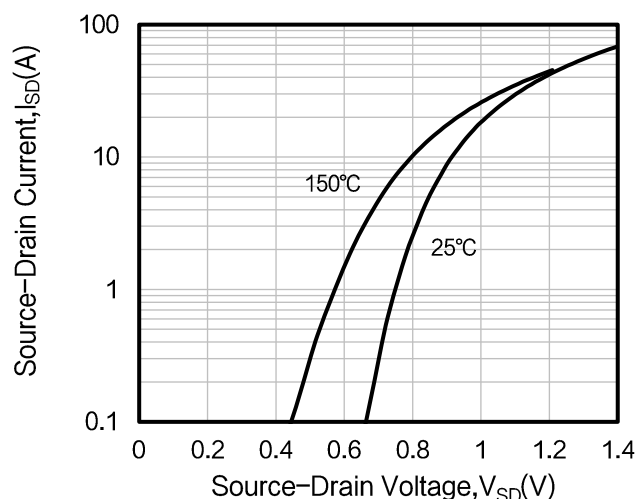
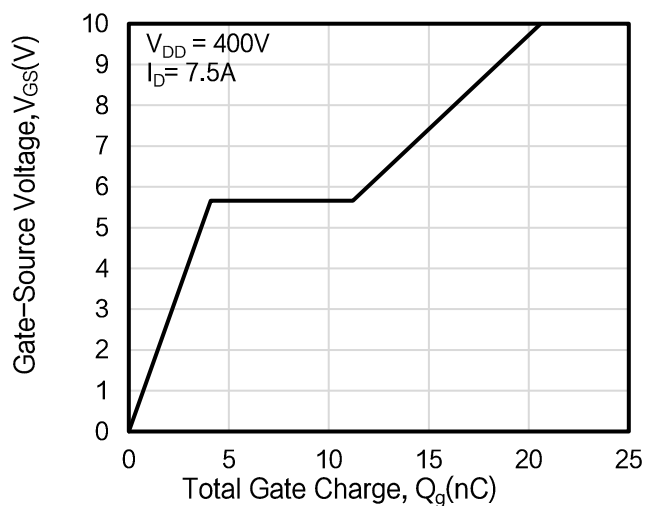


Figure 6. Gate Charge



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 7. Breakdown Voltage vs. Temperature

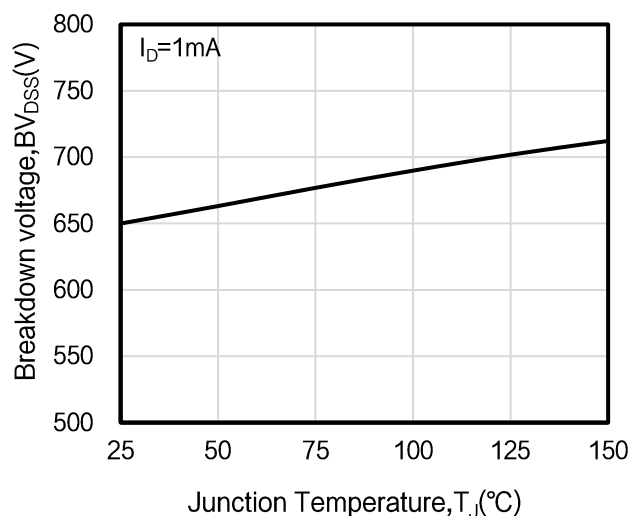


Fig.8 Capacitances

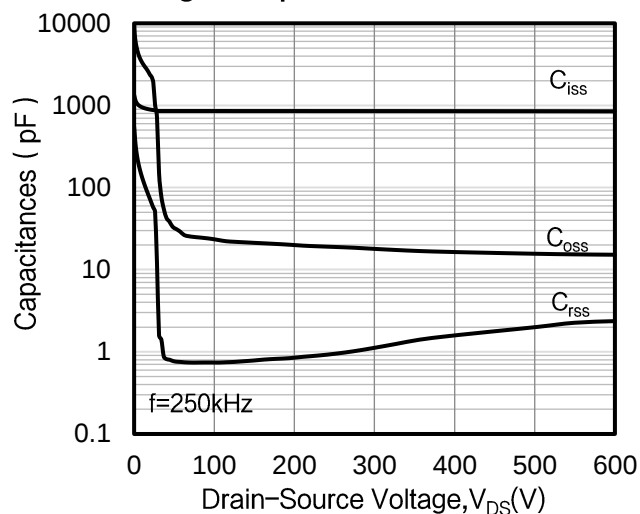


Fig.9 Coss Stored Energy

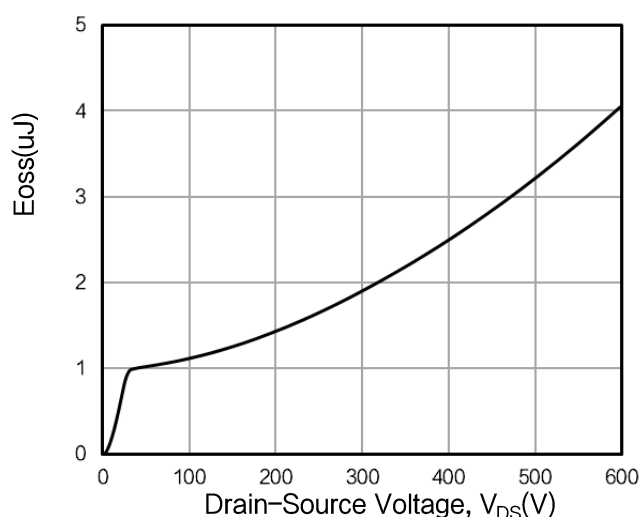


Figure10. Power Dissipation

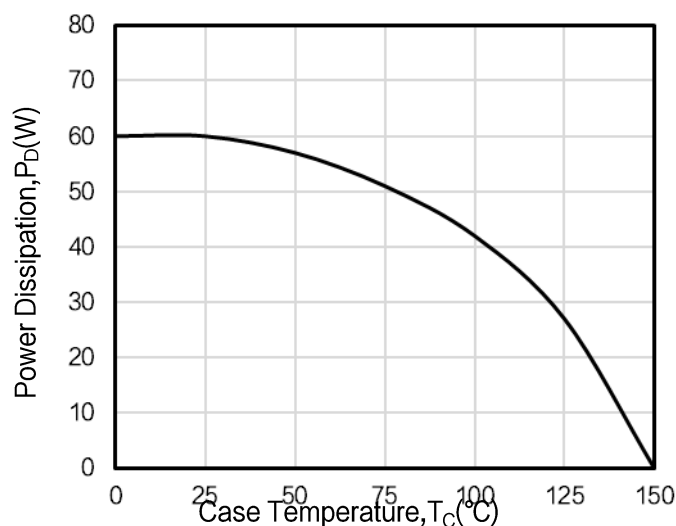


Figure 11. Transient Thermal Impedance

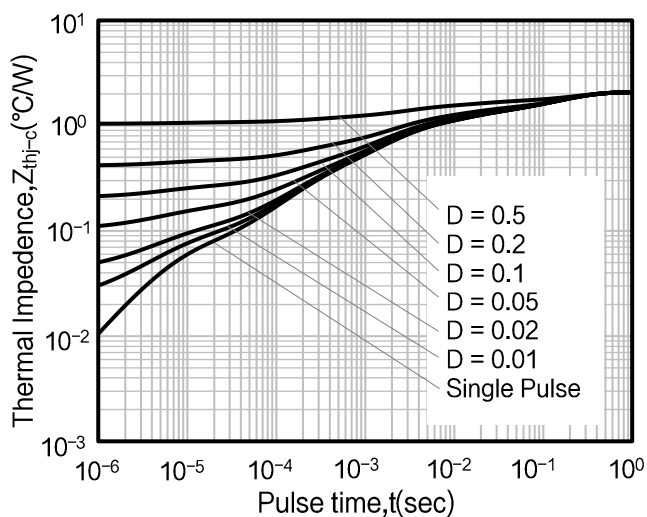


Figure 12. Safe Operation Area

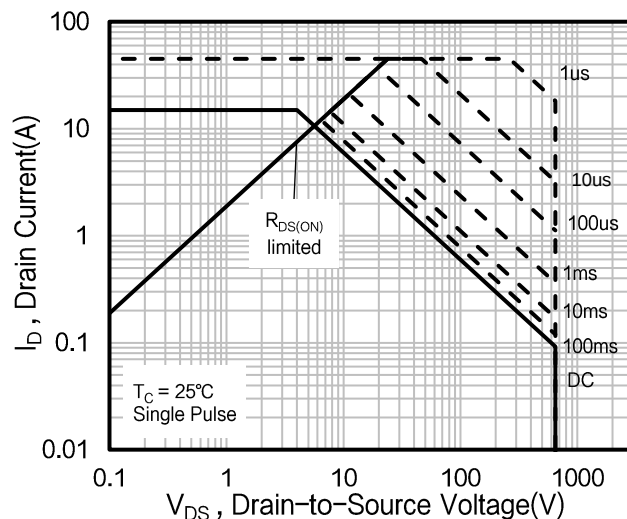


Figure A: Gate Charge Test Circuit and Waveform

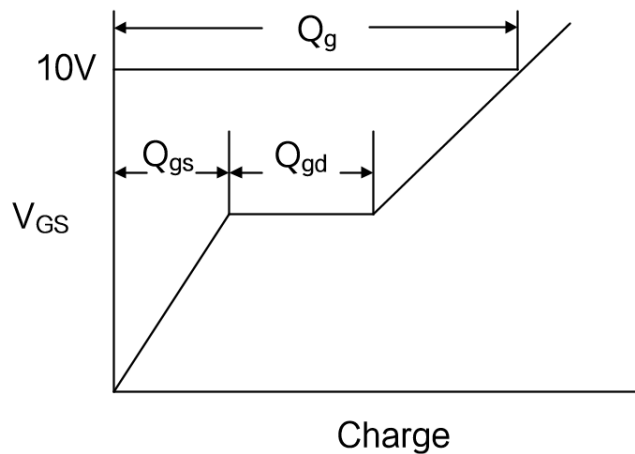
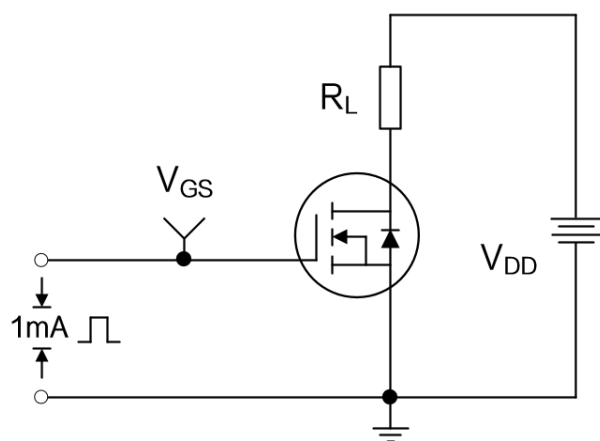


Figure B: Resistive Switching Test Circuit and Waveform

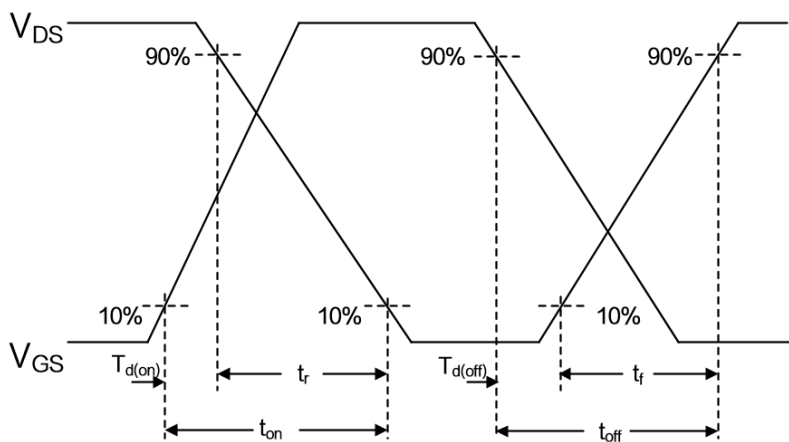
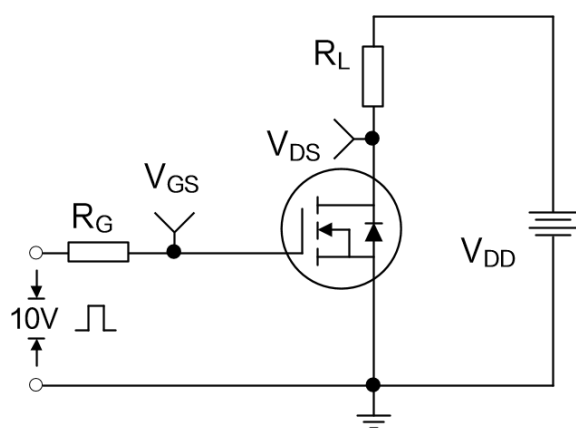
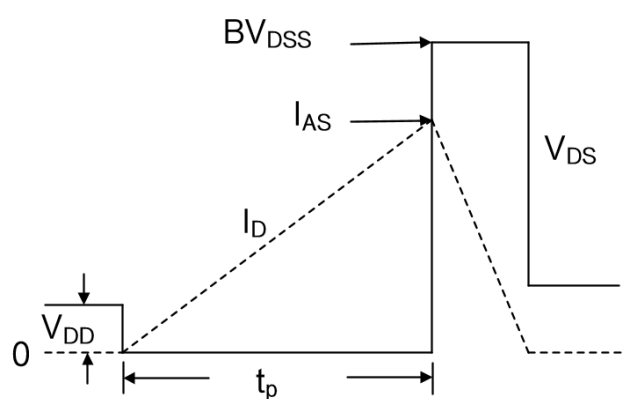
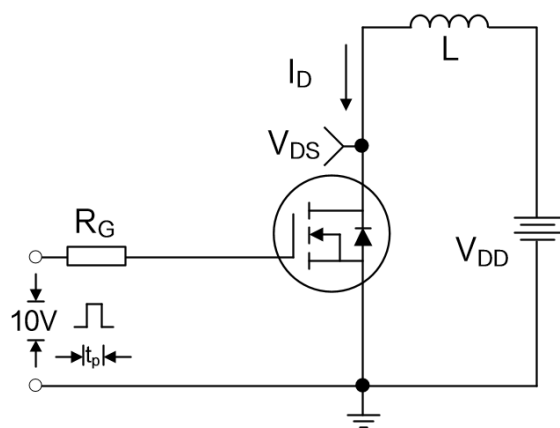
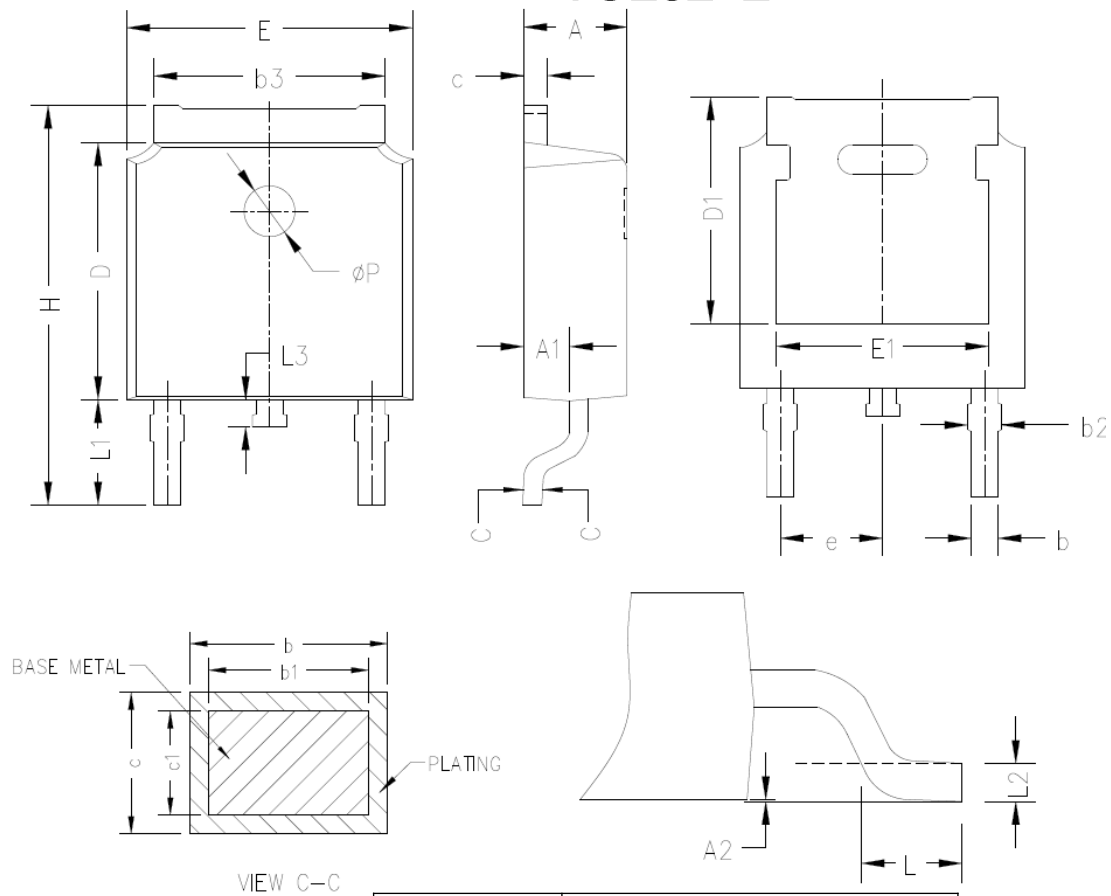


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



TO252-2



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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