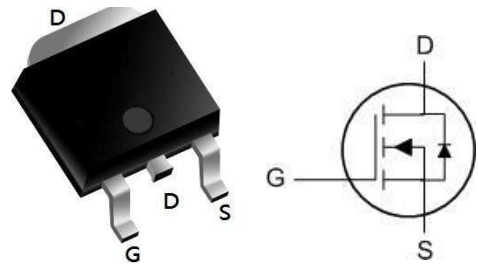


Product Summary

BVDSS	RDSON	ID
650V	0.5 Ω	8A



TO252

- ★ Super Low Gate Charge
- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Excellent CdV/dt effect decline
- ★ Advanced trench gate super junction technology

Absolute Maximum Ratings

Parameter	Sym			Unit
Drain-source voltage	V_{DSS}	650		V
Continuous drain current ¹⁾ ($T_C = 25^\circ\text{C}$)	I_D	8		A
		4.8		A
($T_C = 100^\circ\text{C}$)				
Pulsed drain current ²⁾	I_{DM}	19		A
Gate-source voltage	V_{GS}	±30		V
Avalanche energy, single pulse ³⁾	E_{AS}	45		mJ
Avalanche energy, repetitive ²⁾	E_{AR}	0.15		mJ
Avalanche current, repetitive ²⁾	I_{AR}	1.0		A
Power dissipation ($T_C = 25^\circ\text{C}$)	P_D	57	27	W
		- Derate above 25°C		
		0.46	0.22	W/°C
Operating and storage temperature range	T_{ij}, T_{stg}	-55 to +150		°C
Continuous diode forward current	I_S	8		A
Diode pulse current	$I_{S,pulse}$	19		A

Thermal Characteristics

Parameter	Sym			Unit
Thermal resistance, junction-to-case	$R_{\theta JC}$	2.2	4.6	°C/W
Thermal resistance, junction-to-ambient	$R_{\theta JA}$	62	80	°C/W

Electrical Characteristics $T_c = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static characteristics						
Drain-source breakdown voltage	BV_{DSS}	$V_{GS}=0\text{ V}, I_D=0.25\text{ mA}$	650	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=0.25\text{ mA}$	2	3	4	V
Drain cut-off current	I_{DSS}	$V_{DS}=650\text{ V}, V_{GS}=0\text{ V},$ $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	-	-	1	μA
Gate leakage current, forward	I_{GSSF}	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$	-	-	100	nA
Gate leakage current, reverse	I_{GSSR}	$V_{GS}=-20\text{ V}, V_{DS}=0\text{ V}$	-	-	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10\text{ V}, I_D=1.5\text{ A}$ $T_j = 25^\circ\text{C}$	-	0.5	0.6	Ω
Dynamic characteristics						
Input capacitance	C_{iss}	$V_{DS}= 100\text{ V}, V_{GS}= 0\text{ V},$ $f = 1\text{ MHz}$	-	415	-	pF
Output capacitance	C_{oss}		-	19	-	
Reverse transfer capacitance	C_{rss}		-	0.95	-	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 300\text{ V}, I_D = 2\text{ A}$ $R_G = 25\Omega, V_{GS}=10\text{ V}$	-	12	-	ns
Rise time	t_r		-	10	-	
Turn-off delay time	$t_{d(off)}$		-	62	-	
Fall time	t_f		-	13	-	
Gate charge characteristics						
Gate to source charge	Q_{gs}	$V_{DD}=480\text{ V}, I_D=2\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	1.7	-	nC
Gate to drain charge	Q_{gd}		-	3.5	-	
Gate charge total	Q_g		-	9.6	-	
Gate plateau voltage	$V_{plateau}$		-	5.2	-	V
Reverse diode characteristics						
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_F=1.5\text{ A}$	-	-	1.2	V
Reverse recovery time	t_{rr}	$V_R=50\text{ V}, I_F=2\text{ A},$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	105	-	ns
Reverse recovery charge	Q_{rr}		-	0.6	-	μC
Peak reverse recovery current	I_{rrm}		-	11.3	-	A

Notes:

- Limited by $T_{j\text{max}}$. Maximum duty cycle $D=0.5$.
- Repetitive rating: pulse width limited by maximum junction temperature.
- $I_{AS} = 1.0\text{ A}, V_{DD} = 50\text{ V}, R_G = 25\Omega$, starting $T_j = 25^\circ\text{C}$.

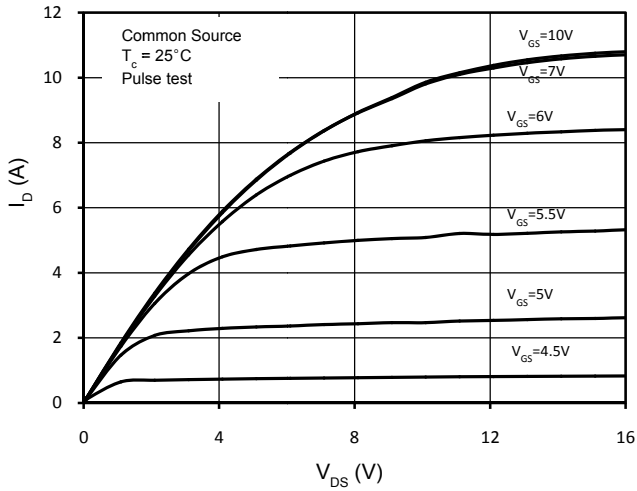


Figure 1. On-Region Characteristics

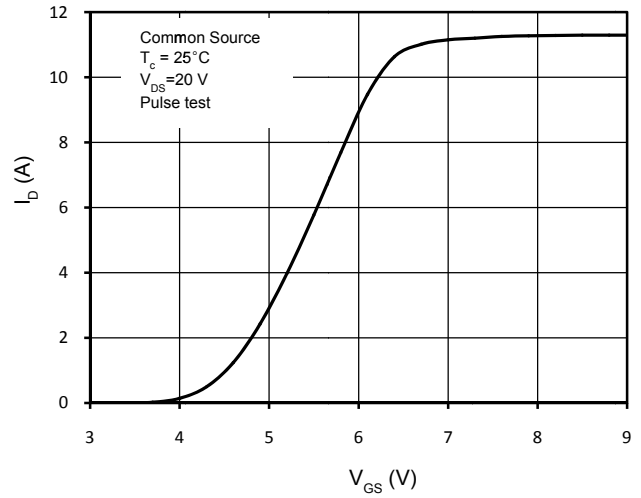


Figure 2. Transfer Characteristics

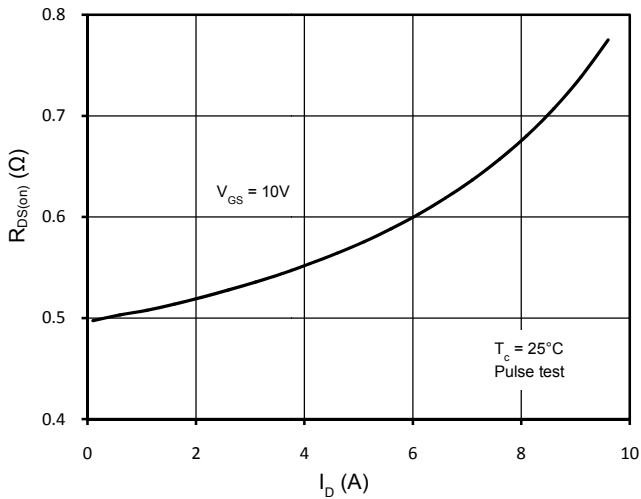


Figure 3. Static Drain-Source On Resistance

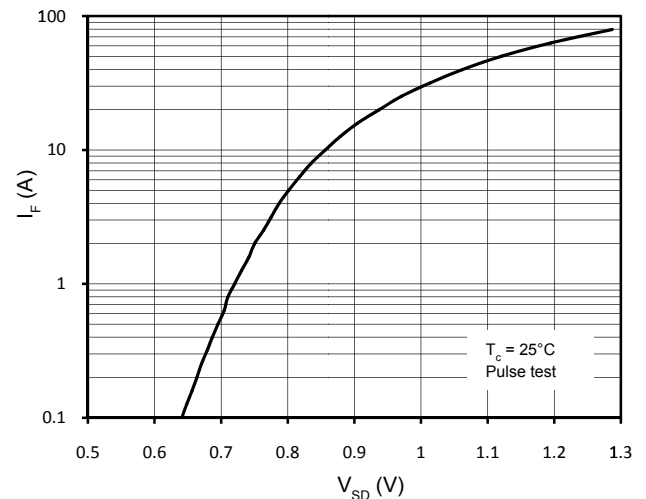


Figure 4. Body-Diode Forward Characteristics

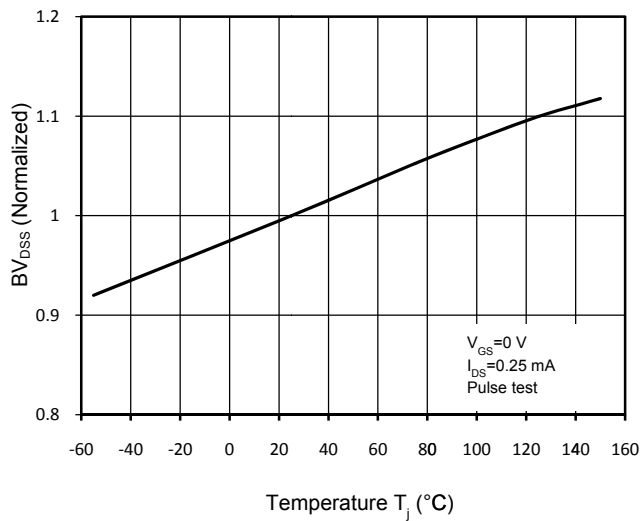


Figure 5. Normalized $BV_{DS(s)}$ vs. Temperature

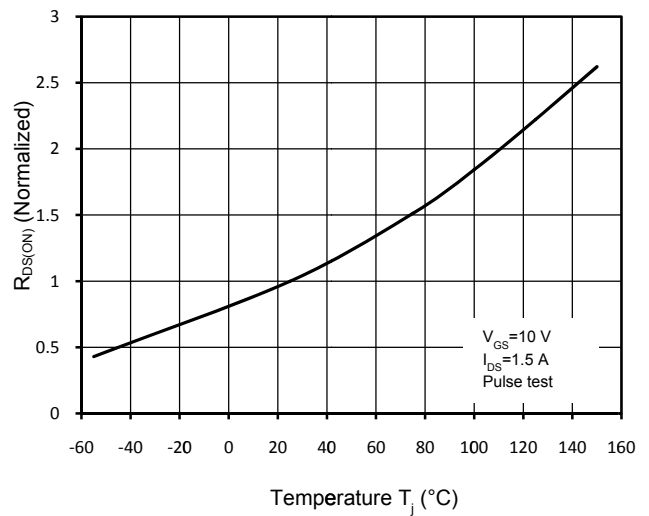


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

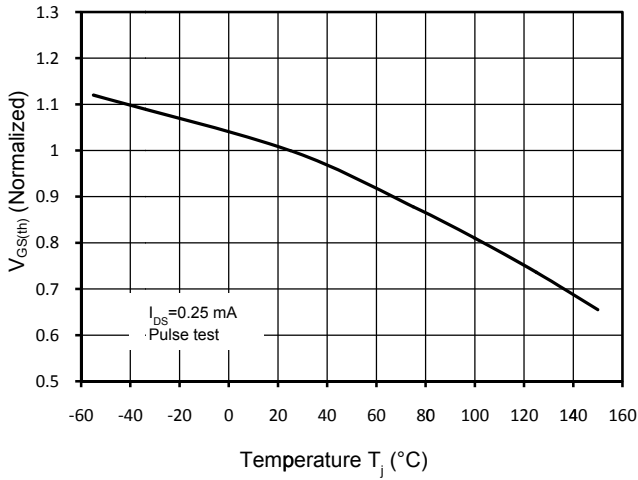


Figure 7. Threshold Voltage vs. Temperature

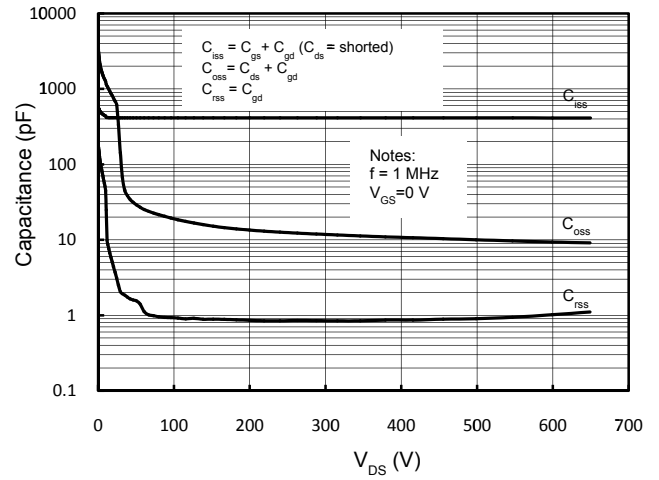


Figure 8. Capacitance Characteristics

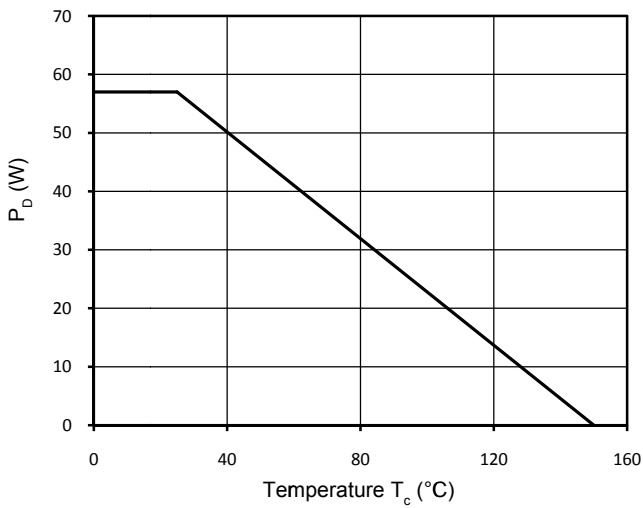


Figure 9. Power Dissipation

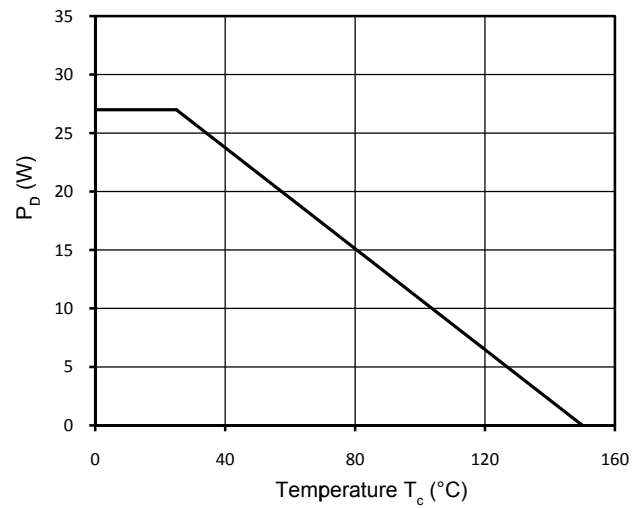


Figure 10. Power Dissipation (TO-220F)

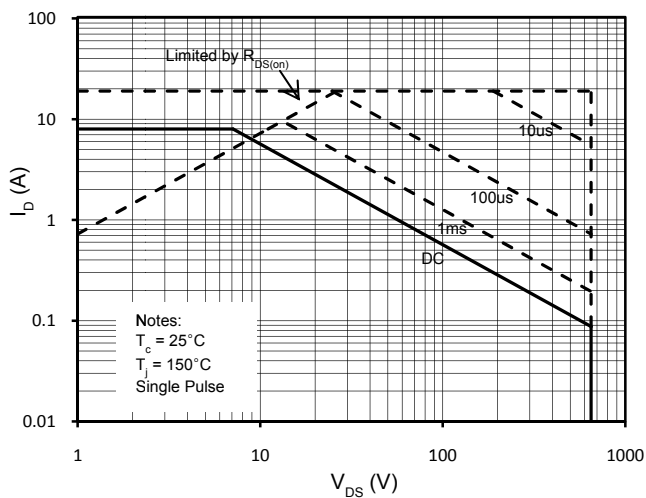


Figure 11. Maximum Safe Operating Area

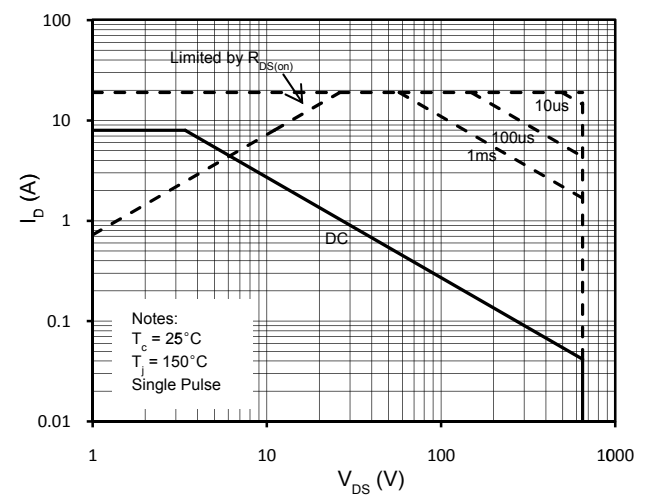


Figure 12. Maximum Safe Operating Area (TO-252)

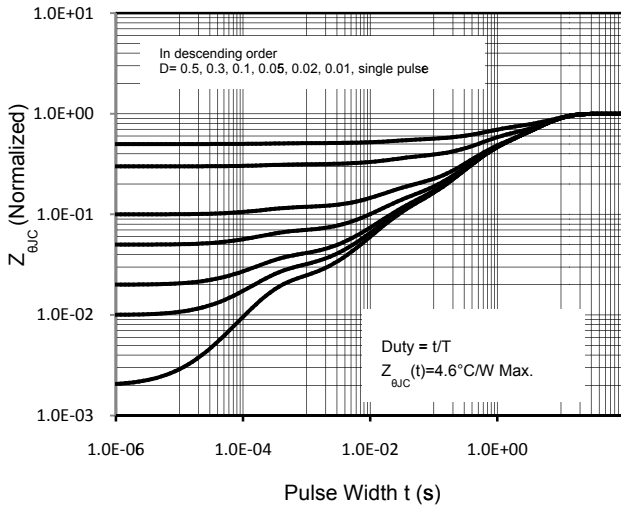


Figure 13. Transient Thermal Response Curve (TO-220F)

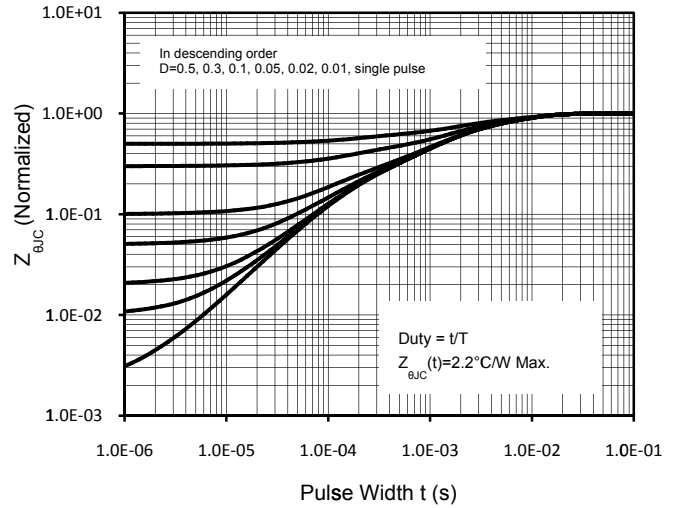


Figure 14. Transient Thermal Response Curve

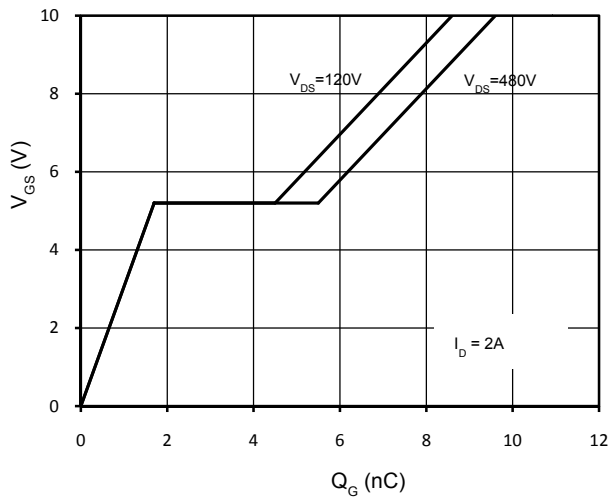
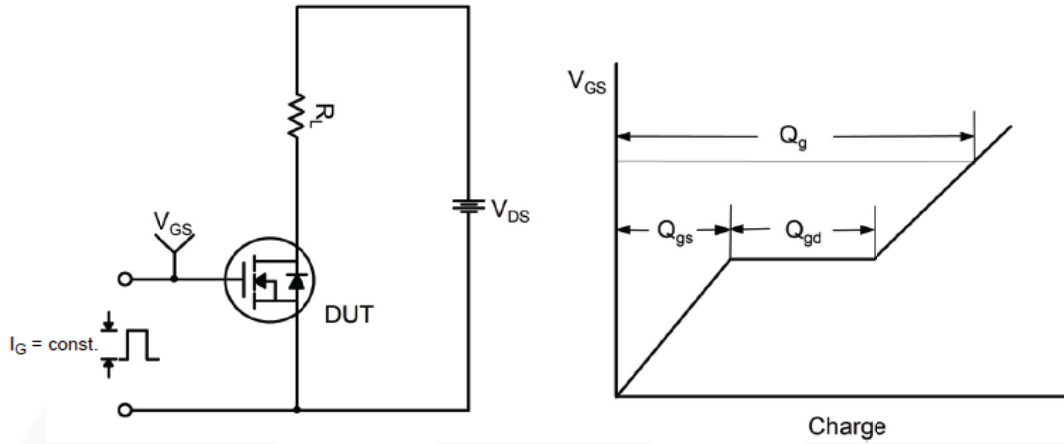
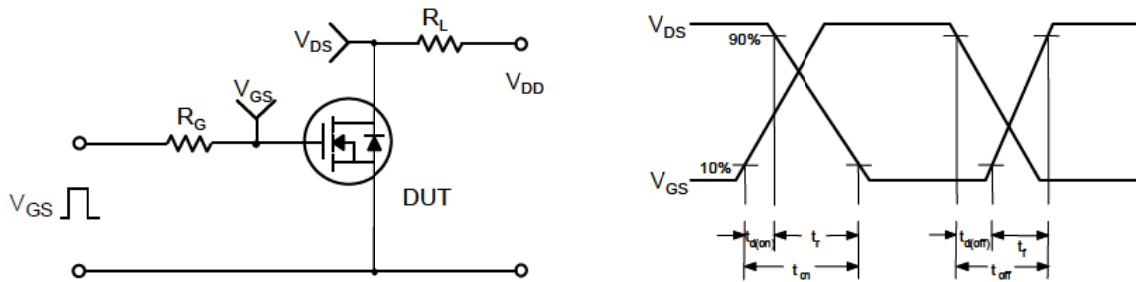


Figure 15. Gate Charge Characteristics

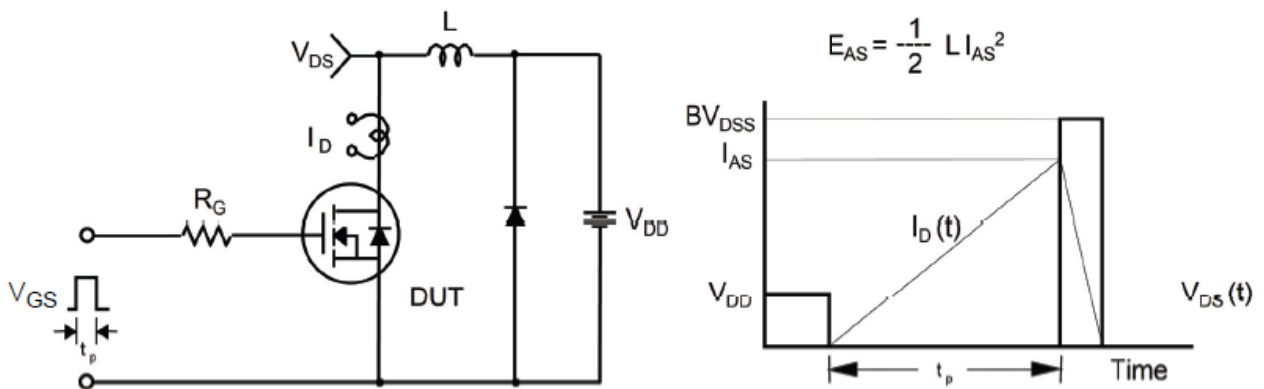
Gate Charge Test Circuit & Waveform

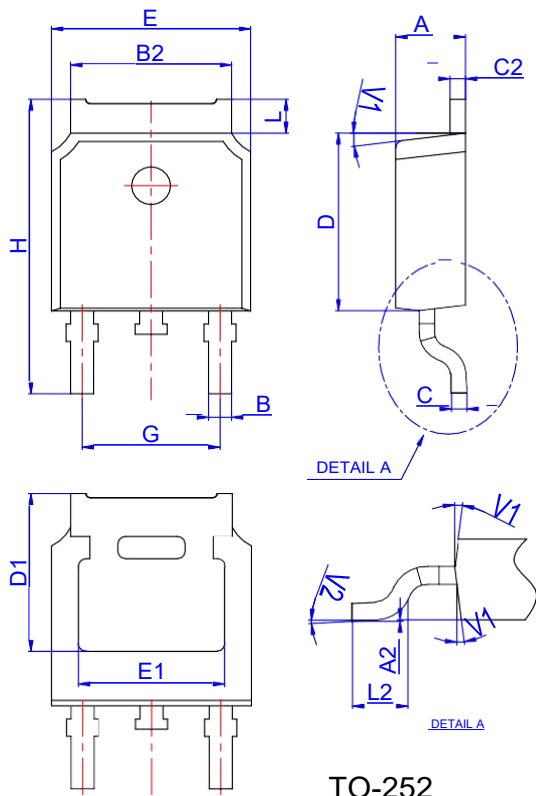


Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Package Mechanical Data-TO-252


Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

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