

Product Summary

- ★ 650V, 8A
 $R_{DS(ON)} < 0.6\Omega$ @ $V_{GS} = 10V$
- ★ Advanced Split Gate Trench Technology
- ★ Excellent $R_{DS(ON)}$ and Low Gate Charge
- ★ Lead free product is acquired

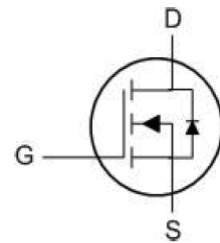
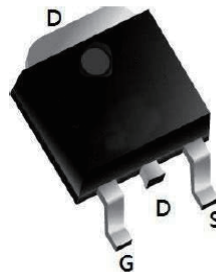
Product Summary

BVDSS	RDSON	ID
650V	0.5Ω	8A

Applications

- ★ Load Switch
- ★ PWM Application
- ★ Power management

TO252 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating		Units	
		10s	Steady State		
V_{DSS}	Drain-Source Voltage	650		V	
V_{GSS}	Gate-Source Voltage	±30		V	
I_D	Continuous Drain Current <small>note1</small>	$T_C = 25^\circ C$	8	A	
		$T_C = 100^\circ C$	4.8	A	
I_{DM}	Pulsed Drain Current <small>note2</small>	19		A	
EAS	Single Pulsed Avalanche Energy <small>(Note3)</small>	45		mJ	
I_{AR}	Avalanche Current <small>(Note 2)</small>	1		A	
EAR	Repetitive Avalanche Energy <small>(Note 2)</small>	0.15		mJ	
P_D	Power Dissipation	$T_C = 25^\circ C$	57	27	W
		Derate above $25^\circ C$	0.46	0.22	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range	-55 To 150		°C	
I_S	Continuous diode forward current	8		A	
$I_{S,pulse}$	Diode pulse current	19		A	

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$	Thermal resistance, junction-to-case	2.2	4.6	°C/W
$R_{\theta A}$	Thermal resistance, junction-to-ambient	62	80	°C/W

Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Static characteristics						
BV_{DSS}	Drain-source breakdown voltage	$V_{GS}=0\text{ V}, I_D=0.25\text{ mA}$	650	-	-	V
$V_{GS(th)}$	Gate threshold voltage	$V_{DS}=V_{GS}, I_D=0.25\text{ mA}$	2	3	4	V
I_{DSS}	Drain cut-off current	$V_{DS}=650\text{ V}, V_{GS}=0\text{ V},$	-	-	1	μA
		$T_J = 125^\circ\text{C}$	-	-30	-	μA
I_{GSSF}	Gate leakage current, forward	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$	-	-	100	nA
I_{GSSR}	Gate leakage current, reverse	$V_{GS}=-20\text{ V}, V_{DS}=0\text{ V}$	-	-	-100	nA
$R_{DS(on)}$	Drain-source on-state resistance	$V_{GS}=10\text{ V}, I_D=1.5\text{ A}, T_J = 25^\circ\text{C}$	-	0.5	0.6	Ω
Dynamic characteristics						
C_{iss}	Input capacitance	$V_{DS}=100\text{ V}, V_{GS}=0\text{ V},$ $f=1\text{ MHz}$	-	415	-	pF
C_{oss}	Output capacitance		-	19	-	
C_{rss}	Reverse transfer capacitance		-	0.95	-	
$t_{d(on)}$	Turn-on delay time	$V_{DD}=300\text{ V}, I_D=2\text{ A}$ $R_G=25\Omega, V_{GS}=10\text{ V}$	-	12	-	ns
t_r	Rise time		-	10	-	
$t_{d(off)}$	Turn-off delay time		-	62	-	
t_f	Fall time		-	13	-	
Gate charge characteristics						
Q_{gs}	Gate to source charge	$V_{DD}=480\text{ V}, I_D=2\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	1.7	-	nC
Q_{gd}	Gate to drain charge		-	3.5	-	
Q_g	Gate charge total		-	9.6	-	
$V_{plateau}$	Gate plateau voltage		-	5.2	-	V
Reverse diode characteristics						
V_{SD}	Diode forward voltage	$V_{GS}=0\text{ V}, I_F=1.5\text{ A}$	-	-	1.2	V
t_{rr}	Reverse recovery time	$V_R=50\text{ V}, I_F=2\text{ A},$ $dI_F/dt=100\text{ A}/\mu\text{s}$	-	105	-	ns
Q_{rr}	Reverse recovery charge		-	0.6	-	μC
I_{rrm}	Peak reverse recovery current		-	11.3	-	A

Notes:

- Limited by T_J 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 $T_J = 25^\circ\text{C}$.

Typical Electrical and Thermal Characteristics (Curves)

Figure 1: On-Region Characteristics

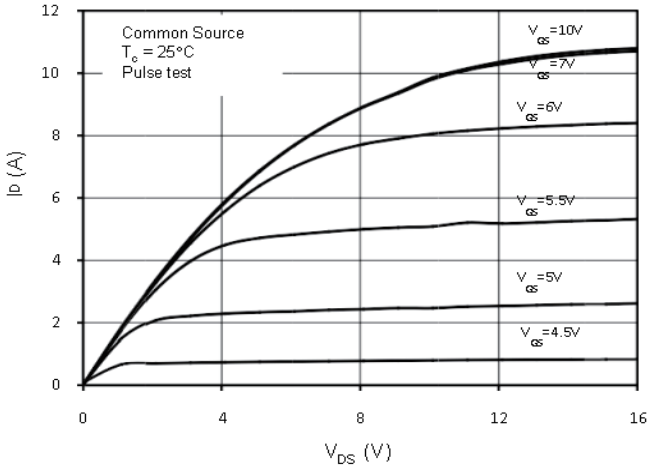


Figure 2: Transfer Characteristics

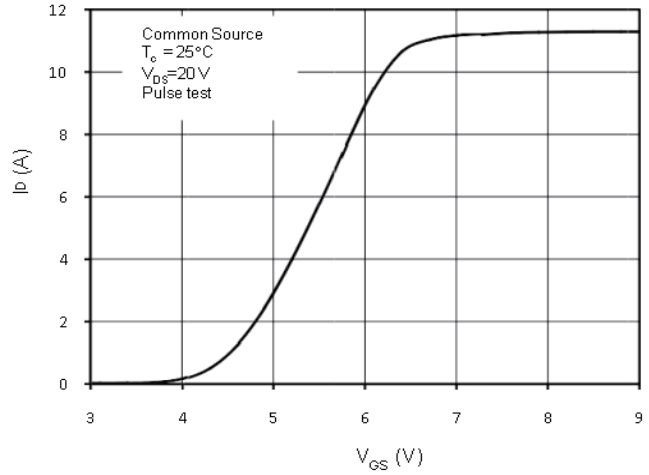


Figure 3: Static Drain-Source On Resistance

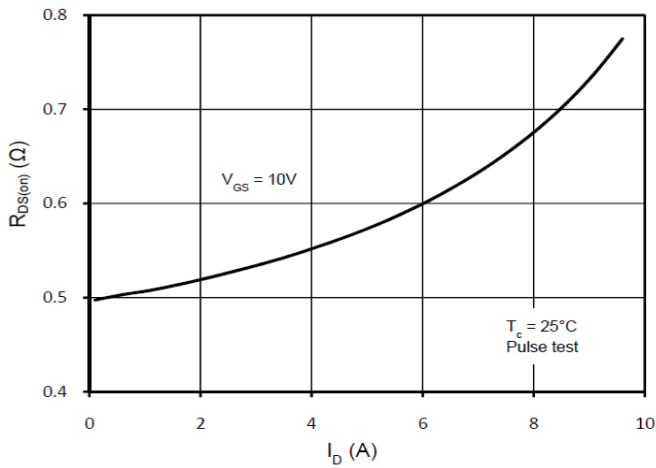


Figure 4: Body Diode Characteristics

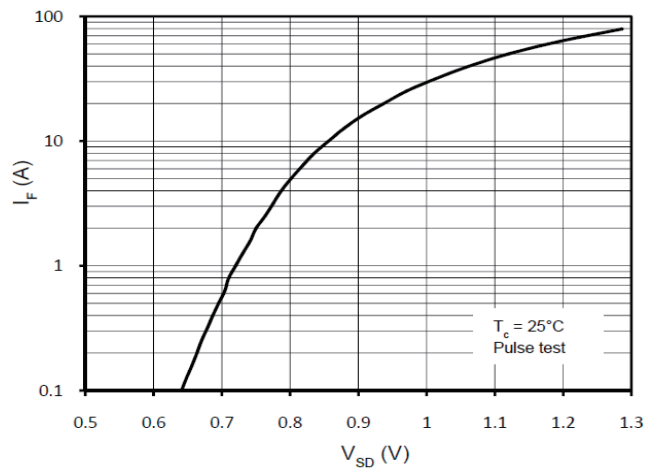


Figure 5: Normalized BVDSS vs. Temperature

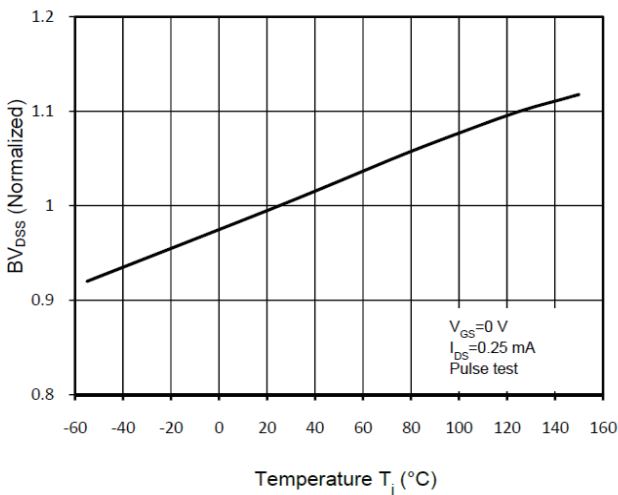
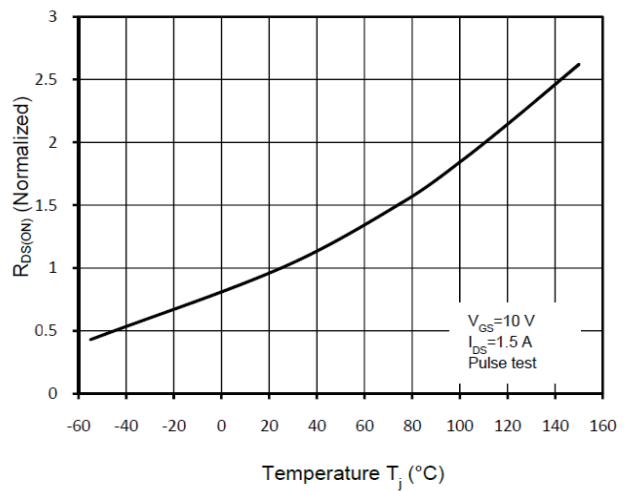


Figure 6: Normalized RDS(on) vs. Temperature



Typical Performance Characteristics

Figure 7: Threshold Voltage vs. Temperature

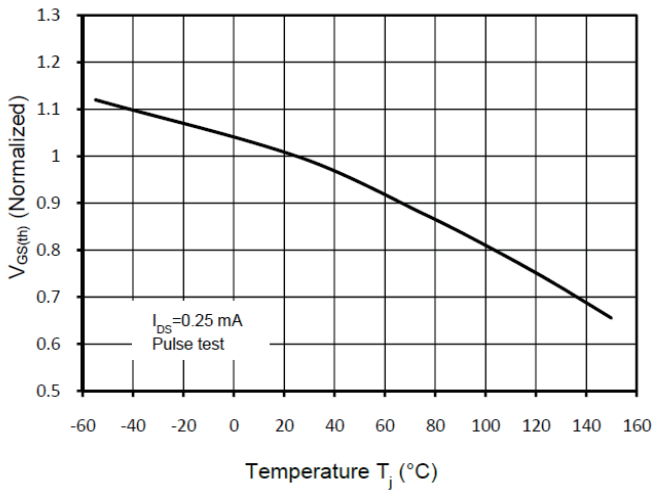


Figure 8: Capacitance Characteristics

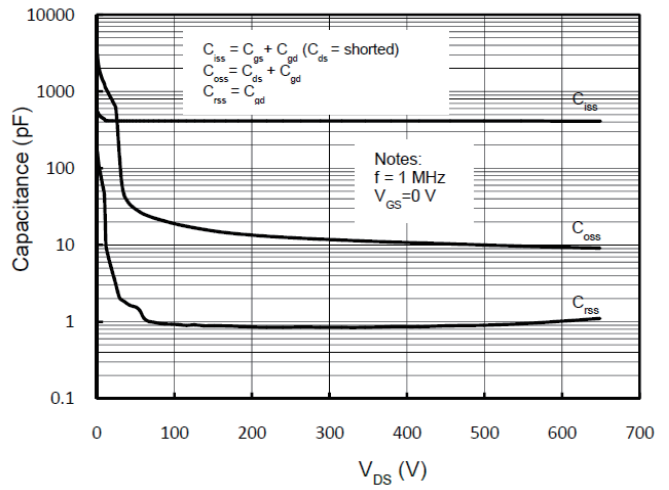


Figure 9: Power Dissipation

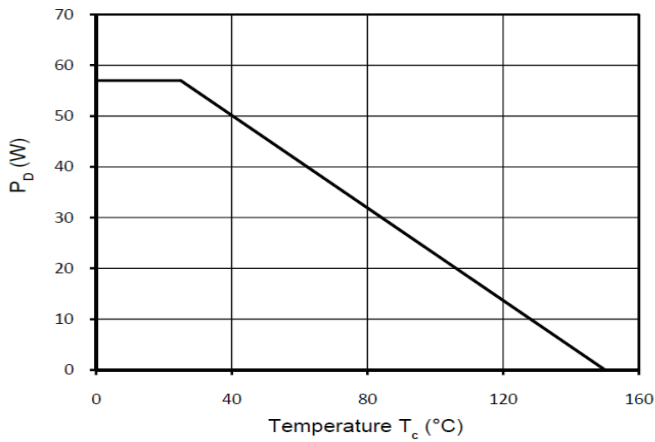


Figure 10: Power Dissipation (TO-220F)

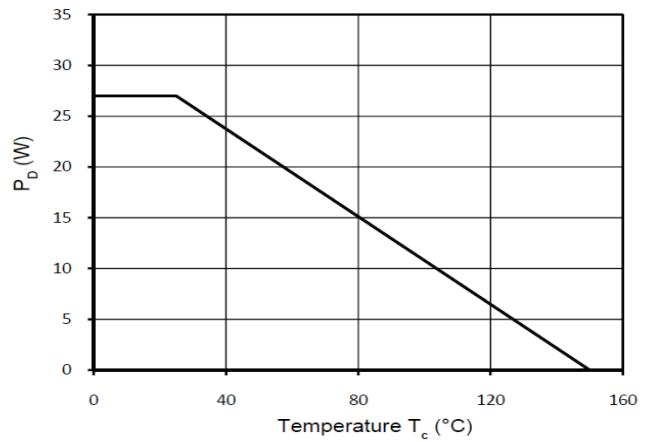


Figure 11: Maximum Safe Operating Area

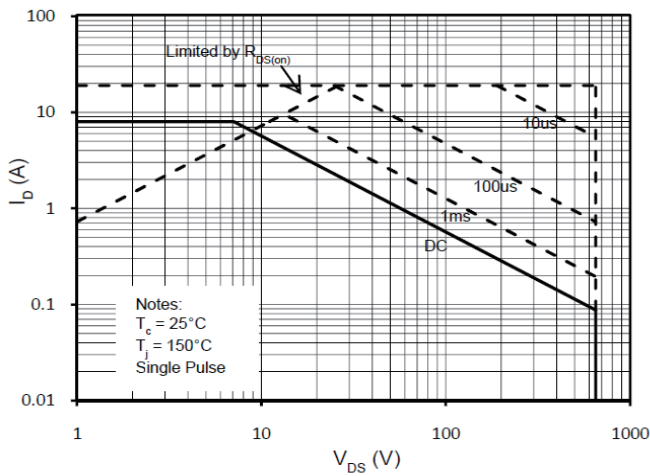
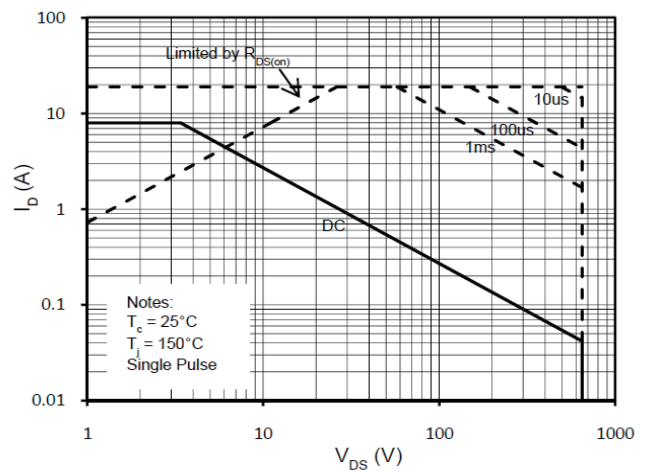


Figure 11: Maximum Safe Operating Area





Typical Performance Characteristics

Figure 13: Transient Thermal Response $Z_{\theta JC}(t)$

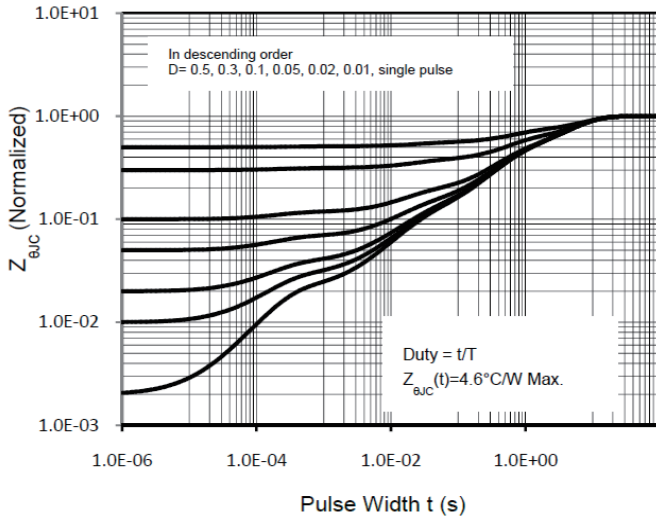


Figure 14: Transient Thermal Response $Z_{\theta JC}(t)$

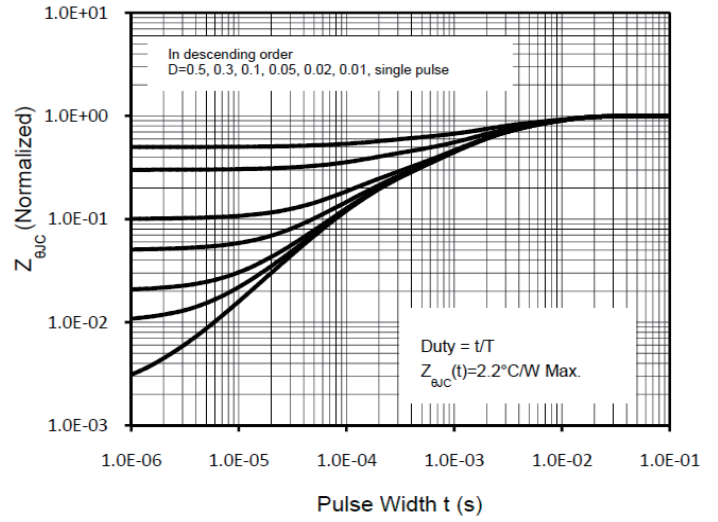
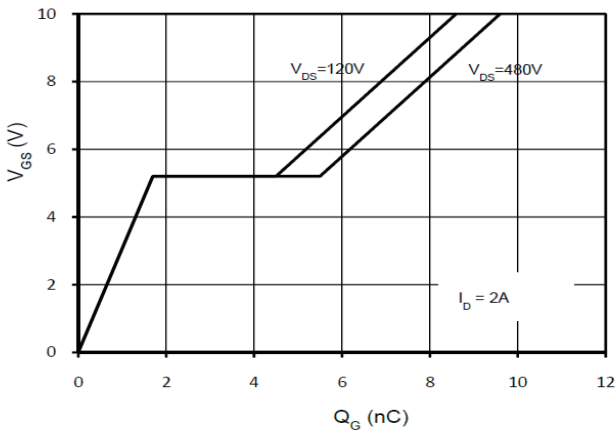
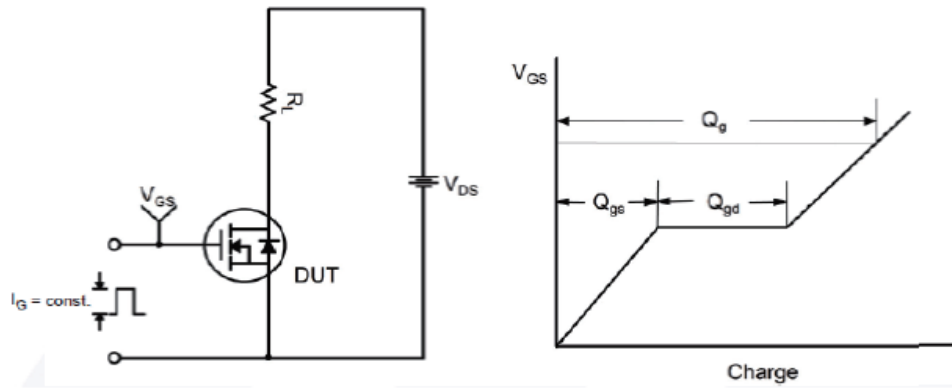


Figure 15: Gate Charge Characteristics

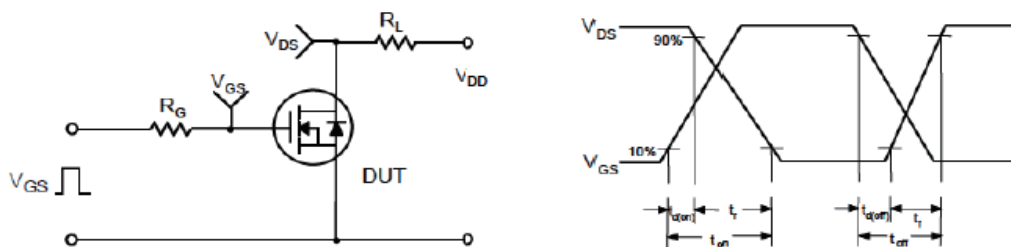


Test circuit

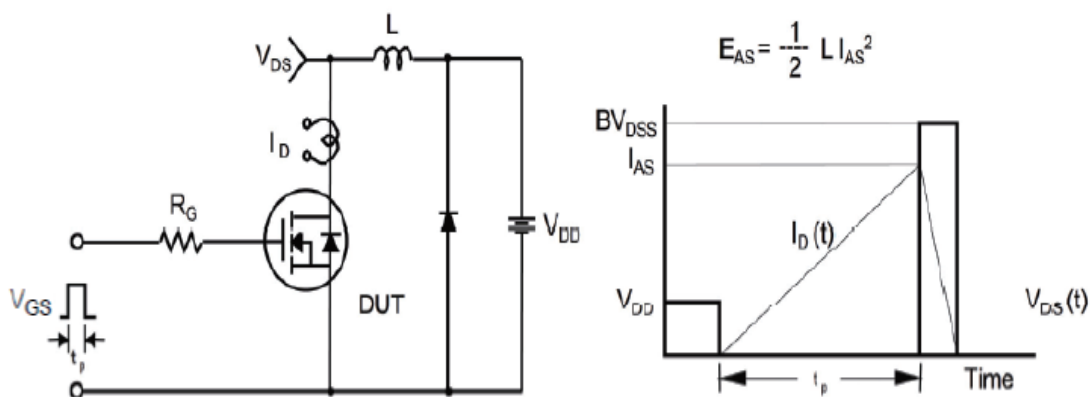
Gate Charge Test Circuit & Waveform



Switching Test Circuit & Waveforms

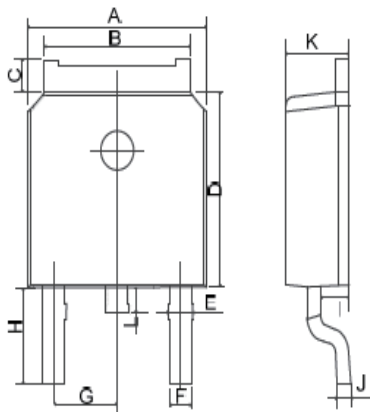


Unclamped Inductive Switching Test Circuit & Waveforms



Package Mechanical Data-TO-252

Mechanical Dimensions for TO-252



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	6.40	6.80
B	5.13	5.50
C	0.88	1.28
D	5.90	6.22
E	0.68	1.10
F	0.68	0.91
G	2.29REF	
H	2.90REF	
I	0.85	1.17
J	0.51REF	
K	2.10	2.50
L	0.40	1.00