

650 V Super Junction Power MOSFET

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

Product Summary



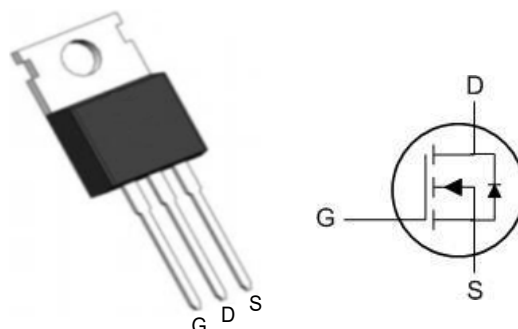
BVDSS	RDS(ON)	ID
650 V	249mΩ	13A

Description

The XR65R250Tg2 use super junction technology and design to provide excellent RDS(ON) with low gate charge. This super junction MOSFET fits the industry's AC-DC SMPS requirements for PFC, AC/DC power conversion, and industrial power applications.

The XR65R250Tg2 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

TO220AB Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	650	V
V_{GS}	Gate-Source Voltage	± 30	V
$I_D@T_C=25^{\circ}\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	13	A
$I_D@T_C=100^{\circ}\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	8	A
I_{DM}	Pulsed Drain Current ²	53	A
EAS	Single Pulse Avalanche Energy ³	120	mJ
I_{AS}	Avalanche Current	---	A
$P_D@T_C=25^{\circ}\text{C}$	Total Power Dissipation ⁴	21	W
T_{STG}	Storage Temperature Range	-55 to 150	$^{\circ}\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^{\circ}\text{C}$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	---	64	$^{\circ}\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	5.84	$^{\circ}\text{C/W}$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=250\mu A$	650	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C , $I_D=1\text{mA}$	---	---	---	$V/^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10V$, $I_D=7.5A$	---	249	300	$\text{m}\Omega$
		$V_{GS}=4.5V$, $I_D=7.5A$	---	---	---	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	2.8	---	3.8	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	---	---	$\text{mV}/^\circ\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=650V$, $V_{GS}=0V$, $T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=650V$, $V_{GS}=0V$, $T_J=150^\circ\text{C}$	---	5	---	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 30V$, $V_{DS}=0V$	---	---	± 100	nA
g_{fs}	Forward Transconductance	$V_{DS}=20V$, $I_D=7.5A$	---	11	---	S
R_g	Gate Resistance	$V_{DS}=0V$, $V_{GS}=0V$, $f=1\text{MHz}$	---	6.5	---	Ω
Q_g	Total Gate Charge	$V_{DS}=480V$, $V_{GS}=10V$, $I_D=7.5A$	---	23.5	---	nC
Q_{gs}	Gate-Source Charge		---	5	---	
Q_{gd}	Gate-Drain Charge		---	10	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{GS}=10V$, $V_{DS}=400V$, $R_G=25\Omega$, $I_D=7.5A$	---	14	---	ns
T_r	Rise Time		---	24	---	
$T_{d(off)}$	Turn-Off Delay Time		---	97	---	
T_f	Fall Time		---	22	---	
C_{iss}	Input Capacitance	$V_{DS}=100V$, $V_{GS}=0V$, $f=1\text{MHz}$	---	750	---	pF
C_{oss}	Output Capacitance		---	40	---	
C_{rss}	Reverse Transfer Capacitance		---	1.4	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current ^{1,4}	$V_G=V_D=0V$, Force Current	---	---	13	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V$, $I_S=7.5A$, $T_J=25^\circ\text{C}$	0.6	0.86	1.1	V
t_{rr}	Reverse Recovery Time	$I_F=11$, $di/dt=100A/\mu s$,	---	250	---	nS
Q_{rr}	Reverse Recovery Charge	$T_J=25^\circ\text{C}$	---	2.94	---	nC

Note :

1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.2.The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$ 3.The EAS data shows Max. rating . The test condition is $T_J=25^\circ\text{C}$, $V_{DD}=200V$, $V_{GS}=10V$, $L=30\text{mH}$ 4.The power dissipation is limited by 150°C junction temperature5.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power

dissipation.

Typical Performance Characteristics

Fig 1. Output Characteristics ($T_J=25^\circ\text{C}$)

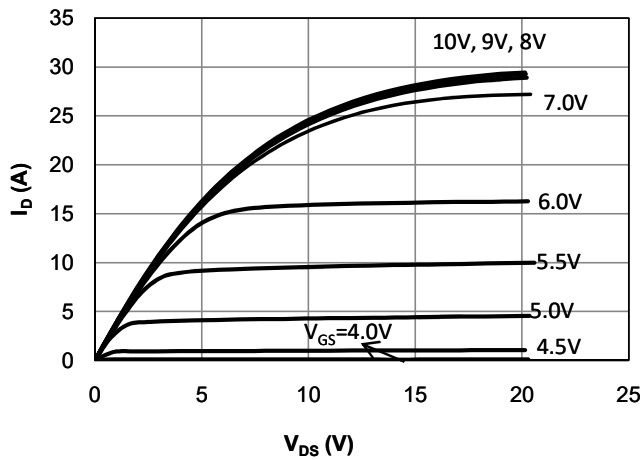


Fig 2. Output Characteristics ($T_J=150^\circ\text{C}$)

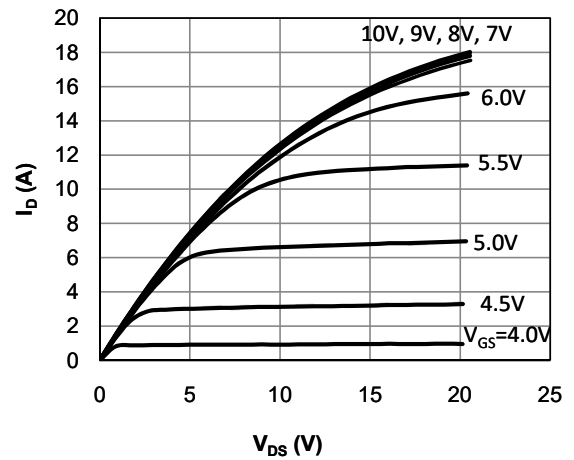


Fig 3: Transfer Characteristics

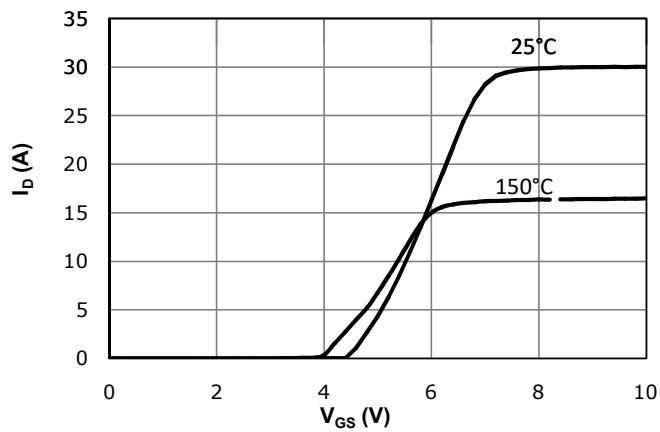


Fig 4: V_{TH} vs. T_J Temperature Characteristics

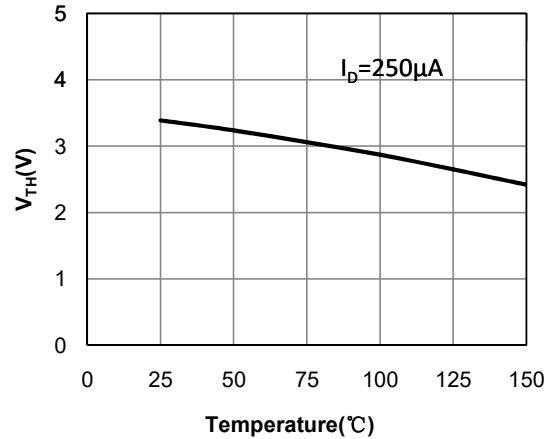


Fig 5: $R_{DS(on)}$ vs. I_{DS} Characteristics ($T_J=25^\circ\text{C}$)

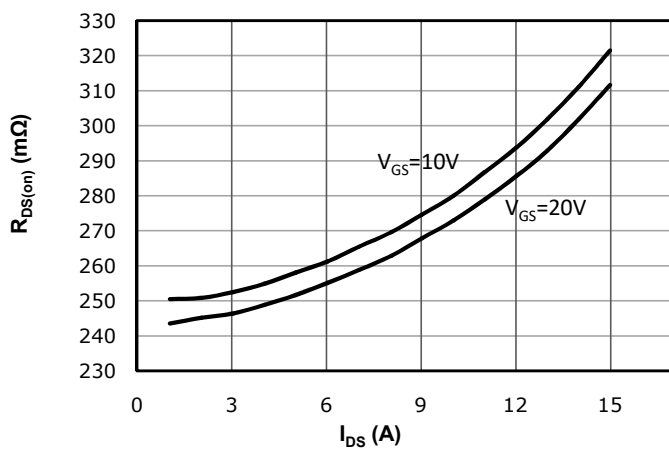


Fig 6: $R_{DS(on)}$ vs. Temperature

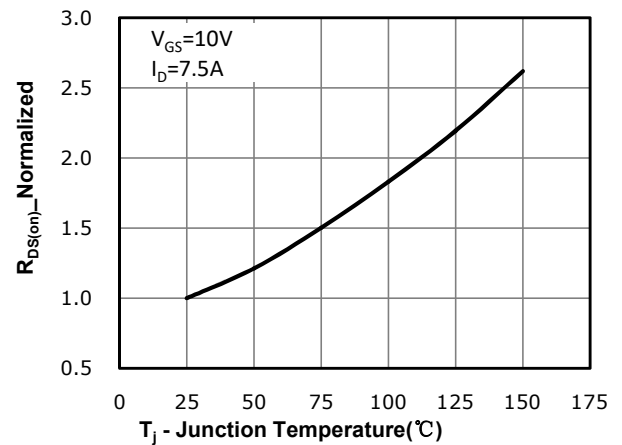


Fig 7: BV_{DSS} vs. Temperature

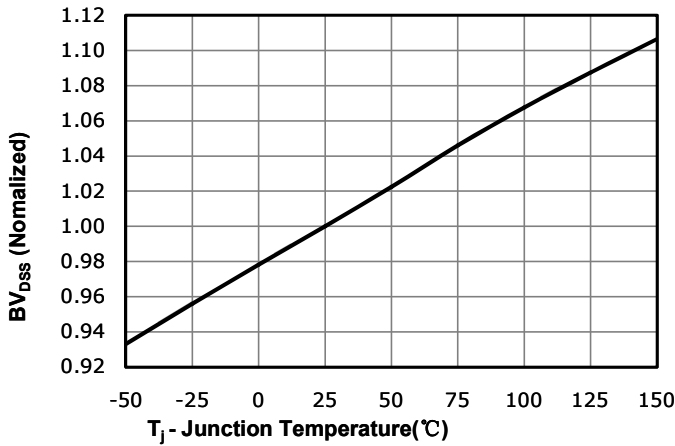


Fig 8: $R_{DS(on)}$ vs. Gate Voltage

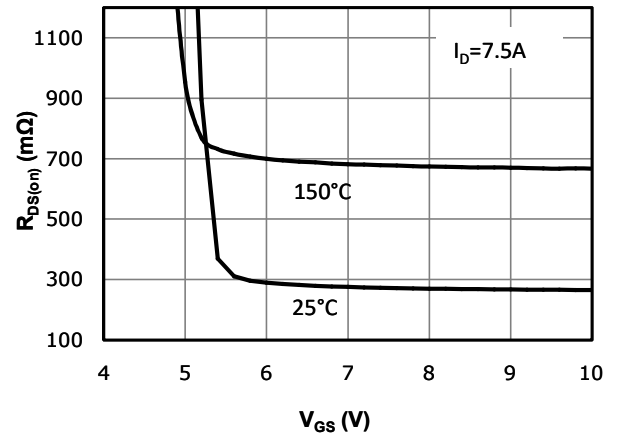


Fig 9: Body-diode Forward Characteristics

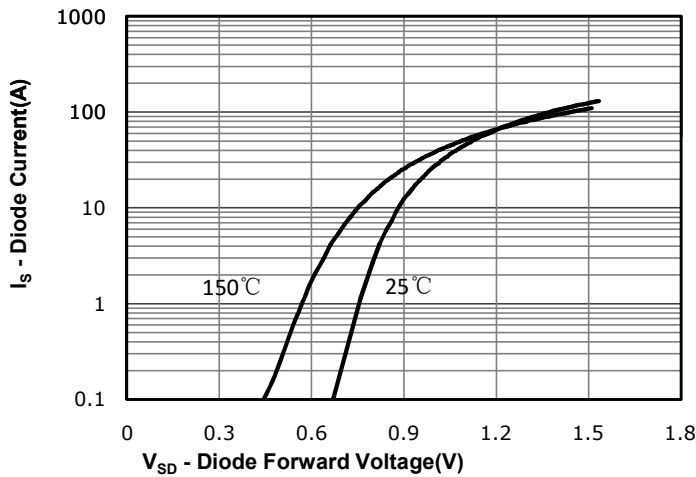


Fig 10: Gate Charge Characteristics

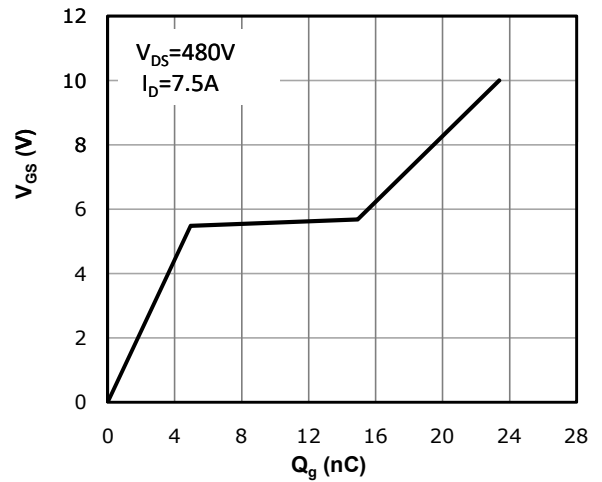


Fig 11: Capacitance Characteristics

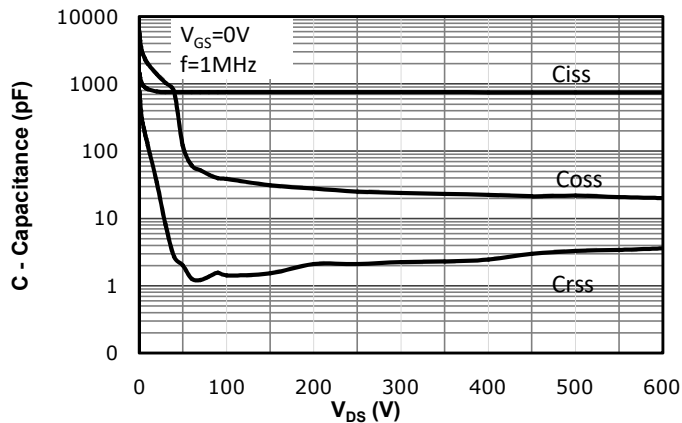


Fig 12: Safe Operating Area

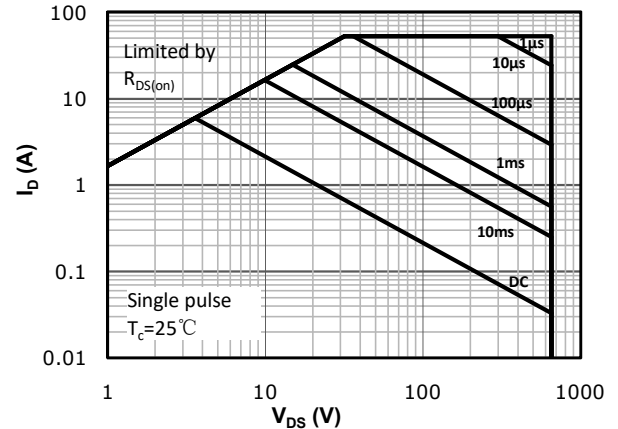
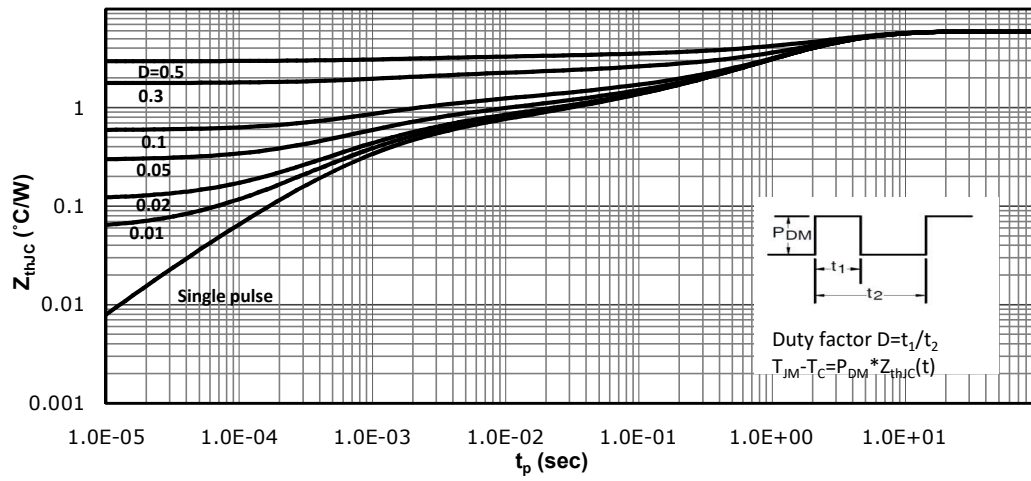
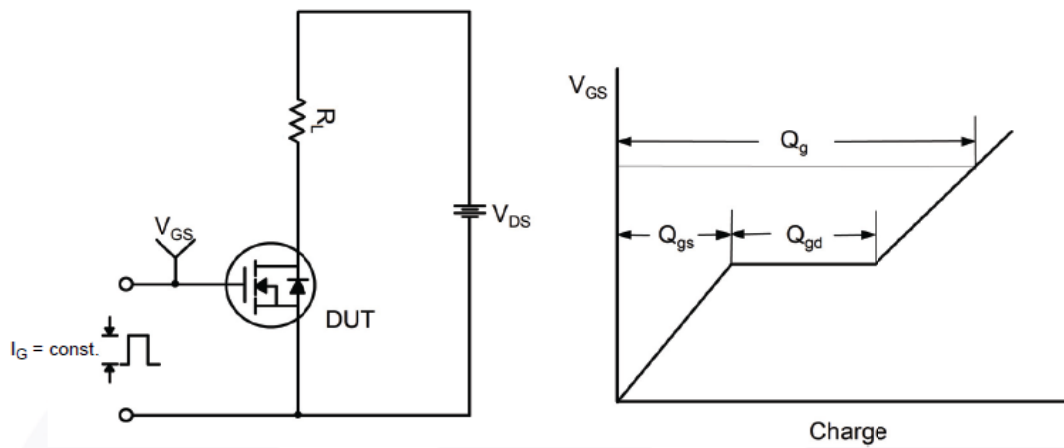


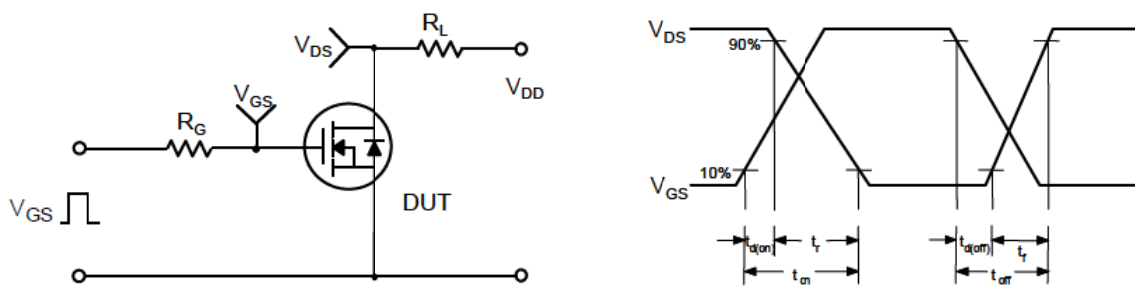
Fig 13: Max. Transient Thermal Impedance



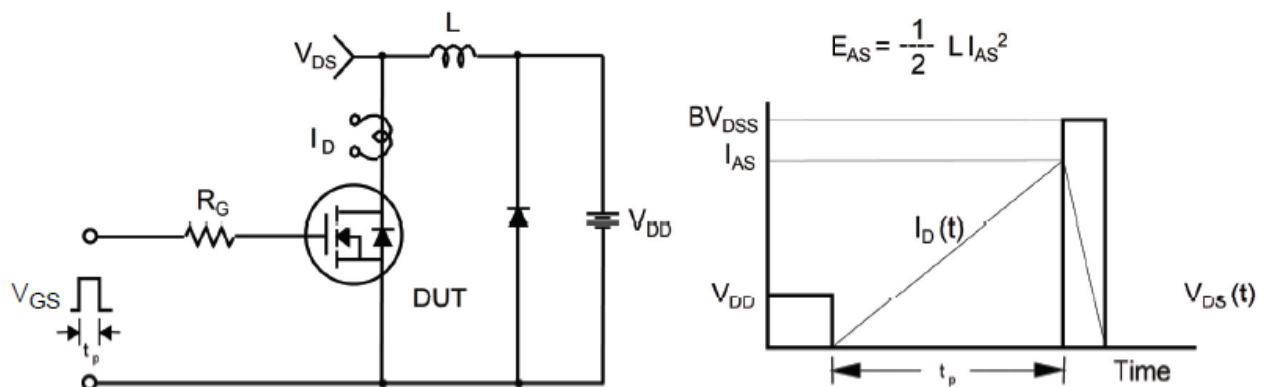
Gate Charge Test Circuit & Waveform



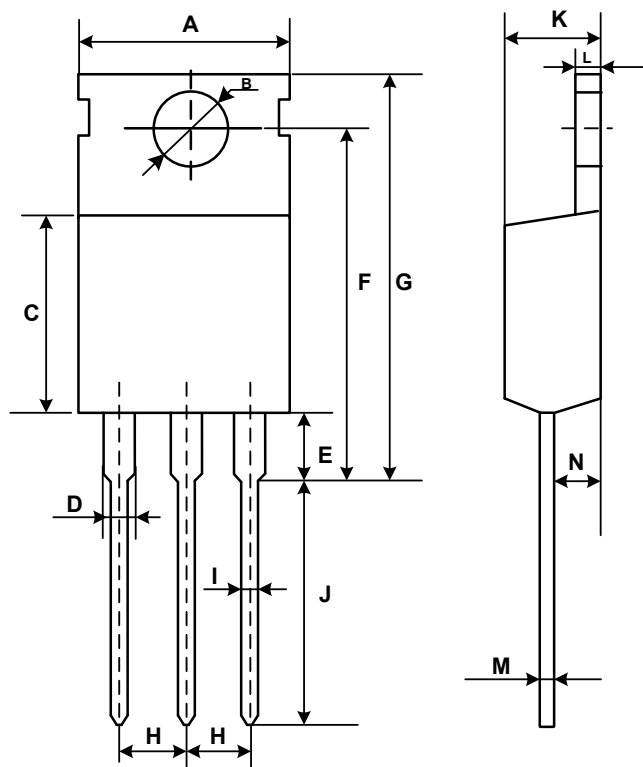
Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Mechanical Dimensions for TO-220



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	9.70	10.30
B	3.40	3.80
C	8.80	9.40
D	1.17	1.47
E	2.60	3.50
F	15.10	16.70
G	19.55MAX	
H	2.54REF	
I	0.70	0.95
J	9.35	11.00
K	4.30	4.77
L	1.20	1.45
M	0.40	0.65
N	2.20	2.60