

## Features

- $V_{DS}=100V, I_D=120A$   
 $R_{DS(on),typ}=6m\Omega @ V_{GS}=10V$
- High density cell design for ultra low  $R_{dson}$
- Low gate charge
- Improved  $dv/dt$  capability
- RoHS product



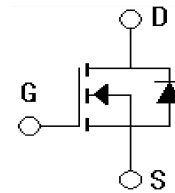
TO-220



TO-263

## Applications

- Power switching application
- Isolated DC/DC converters in Telecom and Industrial
- Synchronous Rectification in DC/DC Converters



## Absolute Ratings ( $T_C=25^\circ C$ )

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DSS}$	100	V
Transient Gate-Source Voltage	$V_{GSS}$	$\pm 30$	V
Continuous Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Drain Current-continuous	$I_D$	120	A
Drain Current-continuous ( $T_C=100^\circ C$ )	$I_D(T_C=100^\circ C)$	100	A
Drain Current-pulse (note 1)	$I_{DM}$	540	A
Single Pulsed Avalanche Energy (note 2)	$E_{AS}$	420	mJ
Maximum Power Dissipation	PD, $T_C=25^\circ C$ Derate above $25^\circ C$	245	W
		2.0	W/ $^\circ C$
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55~+150	$^\circ C$

## Electrical Characteristics( $T_{CASE}=25^\circ C$ unless otherwise specified)

Parameter	Symbol	Tests conditions	Min	Typ	Max	Unit
Drain-Source Voltage	$BV_{DSS}$	$I_D=250\mu A, V_{GS}=0V$	100	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=100V, V_{GS}=0V$	-	-	1	$\mu A$

Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On-Characteristics</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2		4	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{DS}=10V, I_D=20A$	-	6	6.8	m $\Omega$
Forward Transconductance	$g_{fs}$	$V_{DS}=5V, I_D=30A$ (note 4)	-	65	-	S
Gate resistance	$R_g$	$V_{ds}=0V,$ Scan F mode		2.5		$\Omega$
<b>Dynamic Characteristics</b>						
Input capacitance	$C_{iss}$	$V_{DS}=48V, V_{GS}=0V,$ $f=100KHz$	-	3525	-	pF
Output capacitance	$C_{oss}$		-	543	-	pF
Reverse transfer capacitance	$C_{rss}$		-	26	-	pF

**Electrical Characteristics**( $T_{CASE}=25^{\circ}C$  unless otherwise specified)

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
<b>Switching-Characteristics</b>						
Turn-On delay time	$t_{d(on)}$	$V_{DD}=20V, I_D=-30A,$ $R_G=3\Omega V_{GS}=10V$ (note 4,5)	-	21	-	ns
Turn-On rise time	$t_r$		-	36	-	ns
Turn-Off delay time	$t_{d(Off)}$		-	44	-	ns
Turn-Off rise time	$t_f$		-	20	-	ns
Total Gate Charge	$Q_g$	$V_{DS}=80V, I_D=30A,$ $V_{GS}=10V$ (note 4,5)	-	54	-	nC
Gate-Source charge	$Q_{gs}$		-	17	-	nC
Gate-Drain charge	$Q_{gd}$		-	13	-	nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=50A$	-	-	1.4	V
Diode Forward Current	$I_S$	$TC=25^{\circ}C$	-	-	120	A
Reverse recovery time	$T_{rr}$	$I_S=30A, DI/DT=100A/\mu S$	-	64	-	nS
Reverse recovery charge	$Q_{rr}$		-	135	-	nC

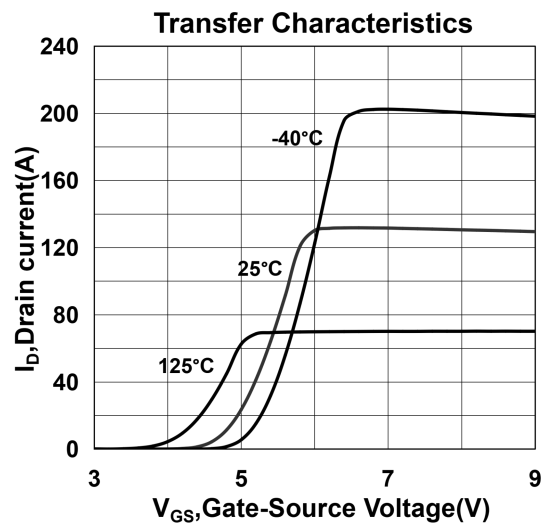
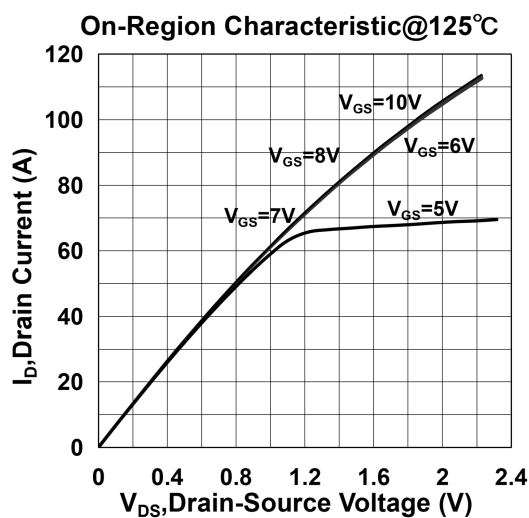
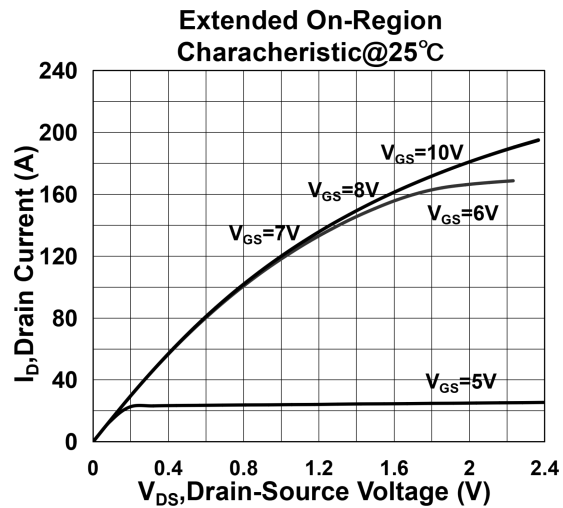
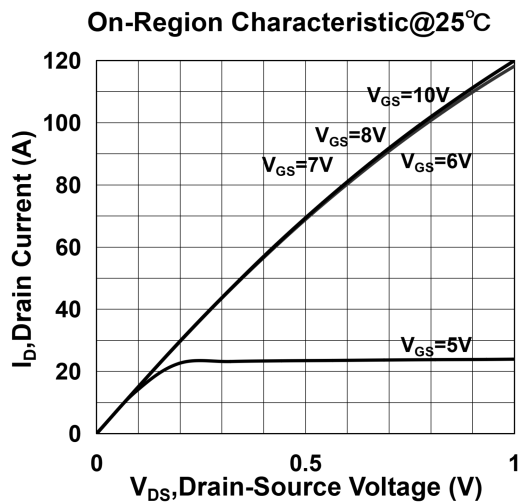
## Thermal Characteristic

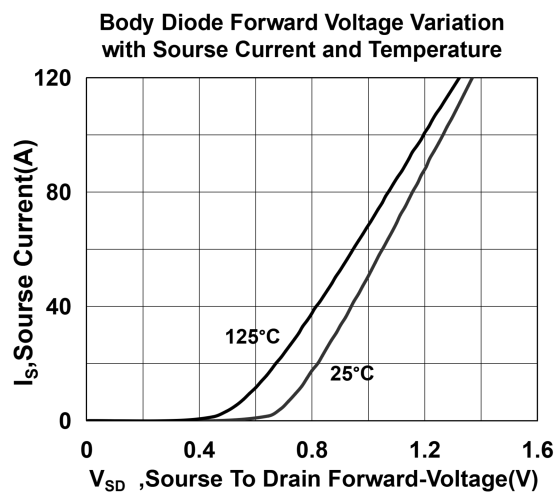
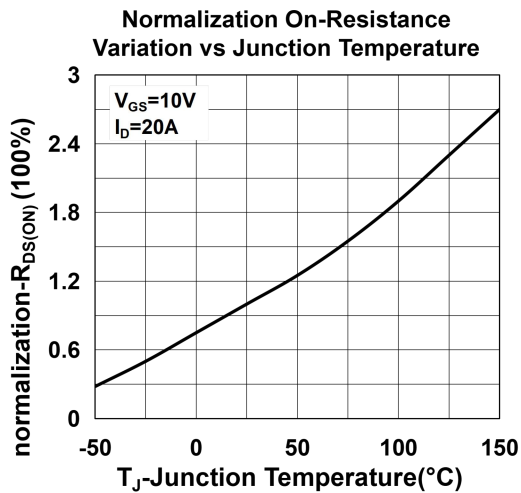
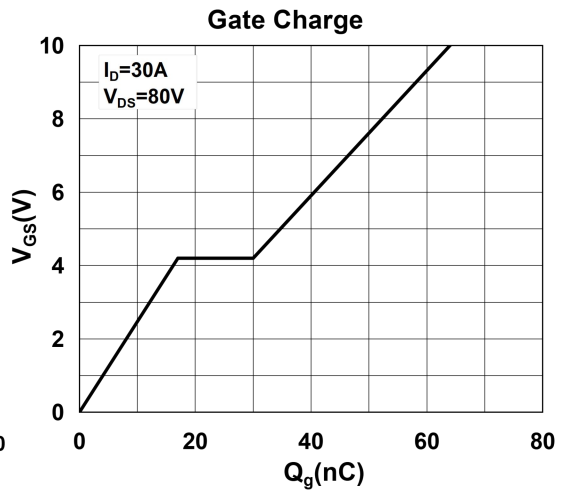
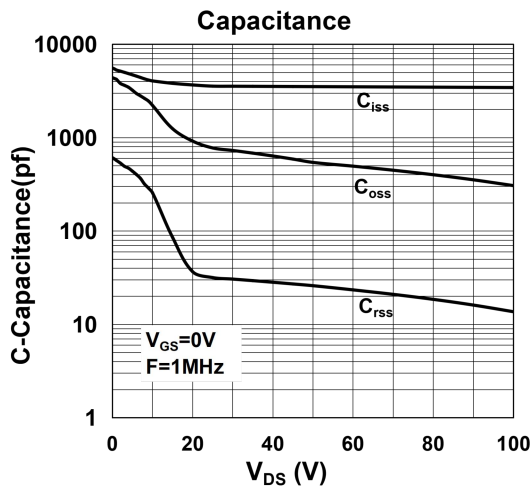
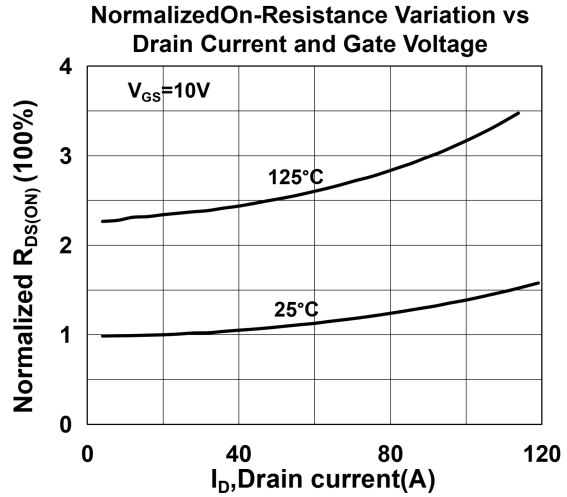
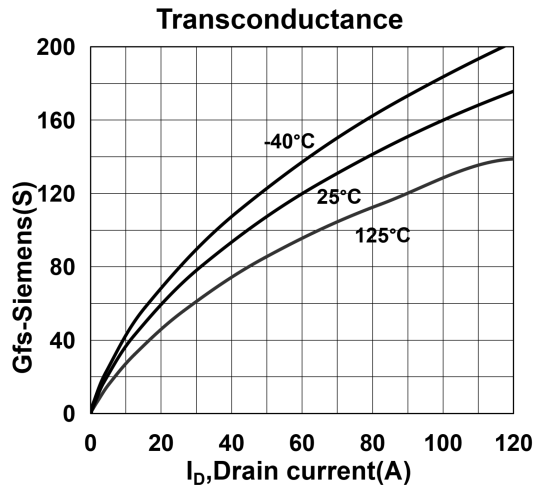
Parameter	Symbol	Value	Unit
Thermal Resistance, junction to Case	$R_{th(j-C)}$	0.51	$^{\circ}C/W$
Thermal Resistance, Junction to Ambient	$R_{th(j-A)}$	47	$^{\circ}C/W$

Notes:

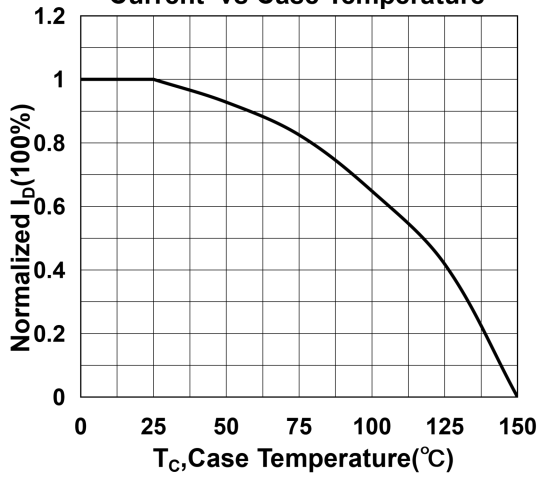
1. Pulse width limited by maximum junction temperature
2.  $I_{AS}=41A$ ,  $V_{DD}=50V$ ,  $R_G=25 \Omega$ , Starting  $T_J=25^{\circ}C$
3.  $I_{SD} \leq 30A$ ,  $di/dt = 100A/us$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J=25^{\circ}C$
4. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$
5. Essentially independent of operating temperature

## Electrical Characteristics

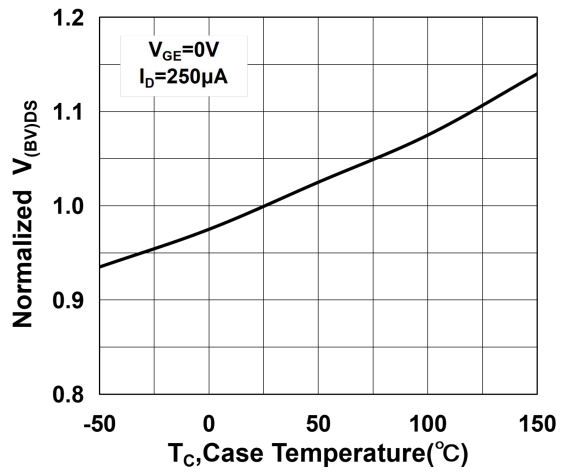




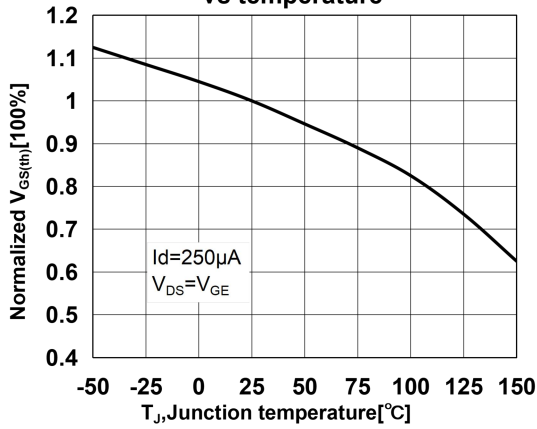
**Normalized Maximum Drain Current vs Case Temperature**



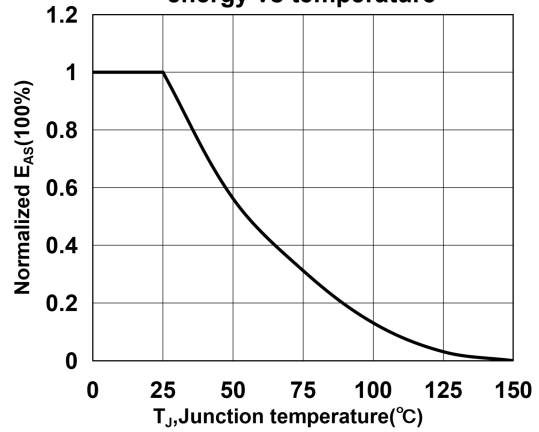
**Normalized  $V_{(BV)DS}$  vs temperature**



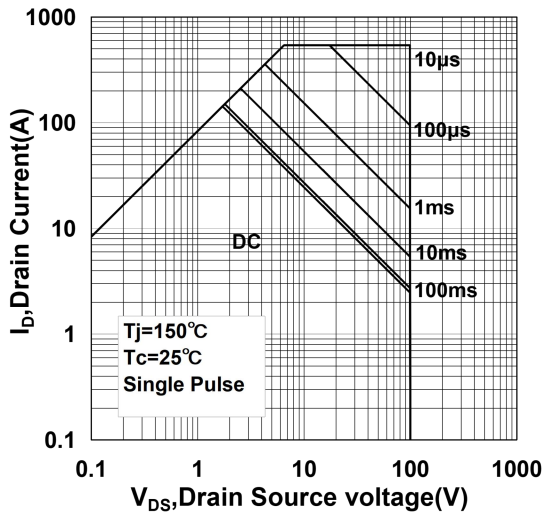
**Normalized gate threshold voltage vs temperature**



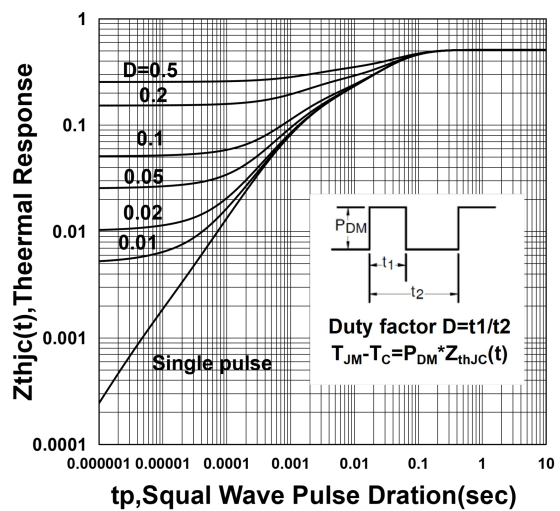
**Normalized maximum avalanche energy vs temperature**



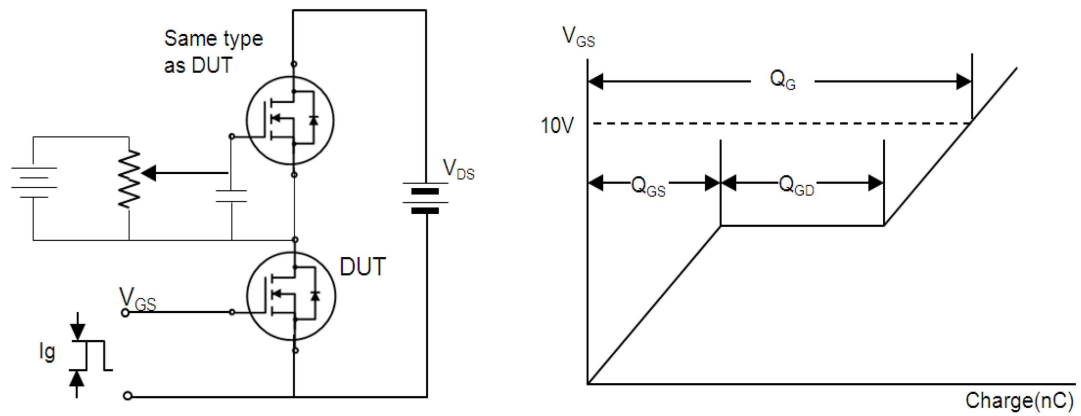
**Safe Operating Area**



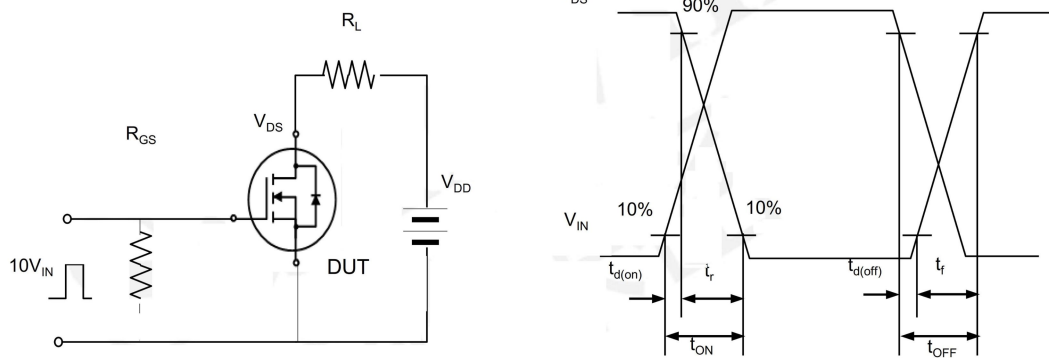
**Transient response Curve**



**Fig. 12. Gate charge test circuit & waveform**



**Fig. 13. Switching time test circuit & waveform**



**Fig. 14. Unclamped Inductive switching test circuit & waveform**

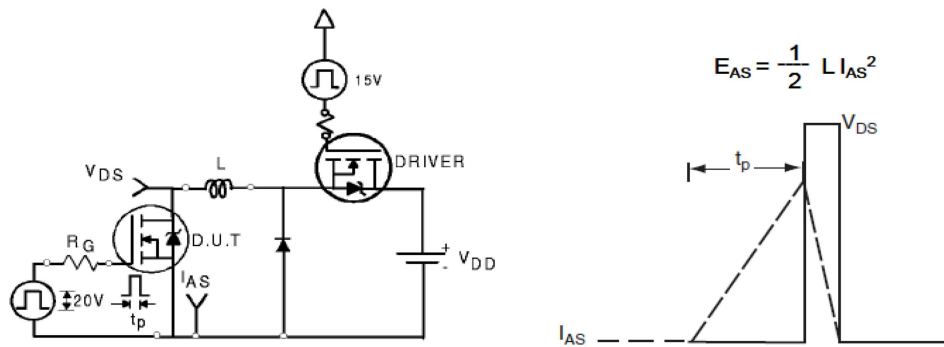
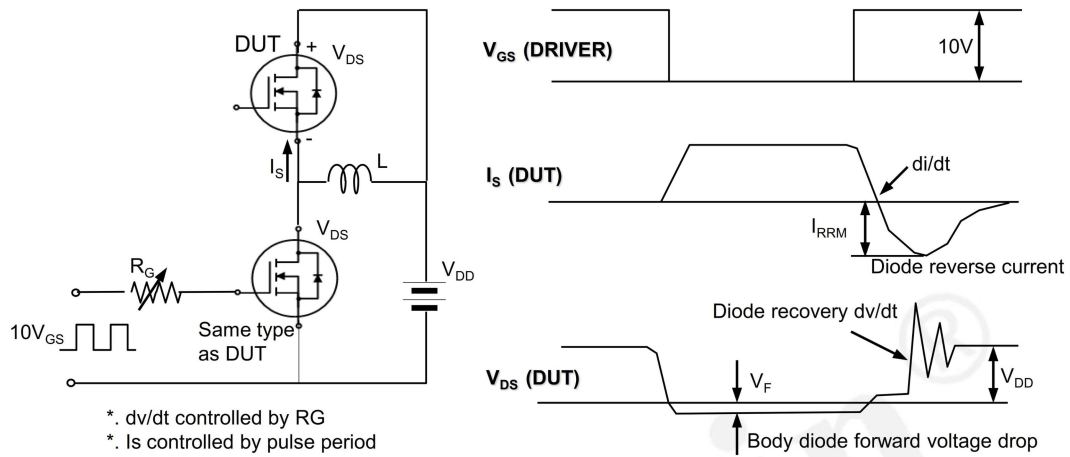
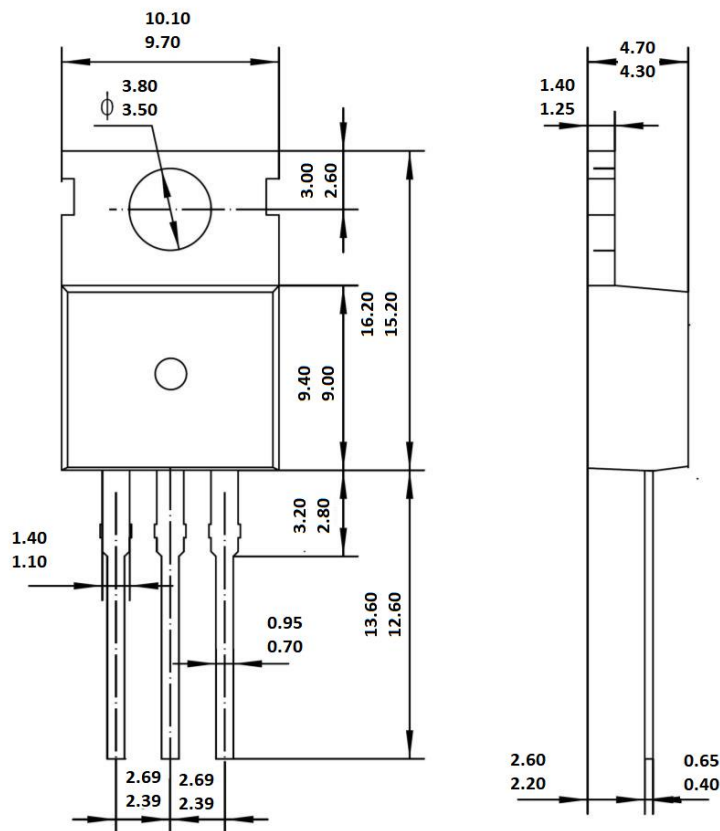


Fig. 15. Peak diode recovery dv/dt test circuit & waveform

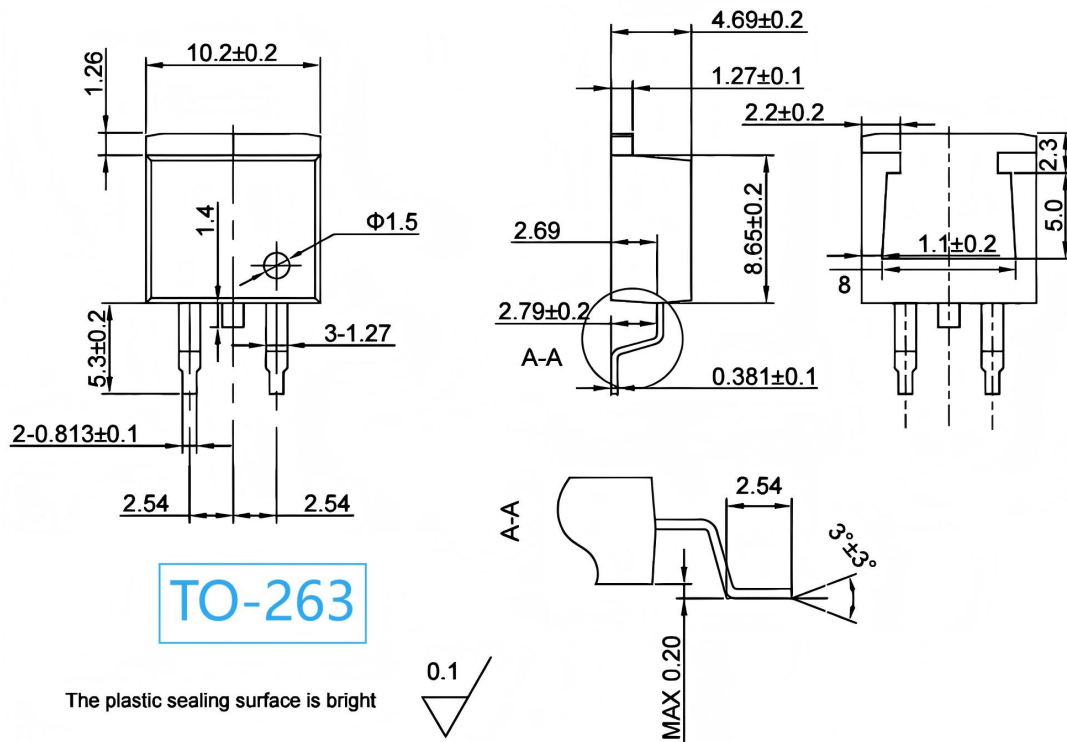


## Package Mechanical DATA



**TO-220**

**Unit: mm**



**Notes:**

1. Unmarked tolerance  $\pm 0.15$  mm; unmarked  $R < 0.15$  mm
2. The resin body is not allowed to have defects, shrinkage holes, cracks, bubbles and other harmful defects
3. The drawing indicates that the leg has reinforcement
4. Unit : mm