

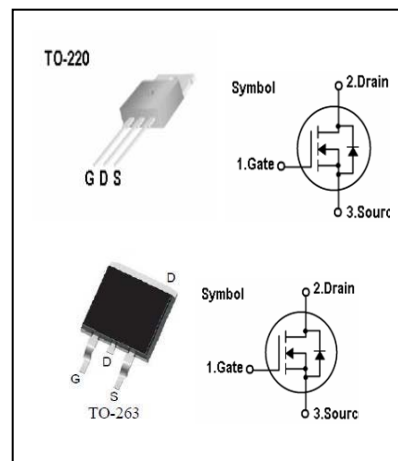
## N-Channel MOSFET

### Features

- 90V,150A,Rds(on)(typ)=4.5mΩ @Vgs=10V
- High Ruggedness
- Fast Switching
- 100% Avalanche Tested
- Improved dv/dt Capability
- Split-Gate MOS Technology

### General Description

This Power MOSFET is produced using Si-Tech's advanced Split-Gate MOS Technology. This latest technology has been especially designed to minimize on-state resistance, have a high rugged avalanche characteristics. These devices are well suited for low voltage application such as automotive, DC/DC converters, and high efficiency switch for power management in portable and battery products.



### Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V <sub>DSS</sub>	Drain-Source Voltage	90	V
I <sub>D</sub>	Continuous Drain Current (T <sub>c</sub> =25°C)	150	A
	Continuous Drain Current (T <sub>c</sub> =100°C)	105	A
I <sub>DM</sub>	Pulsed Drain Current (Note 1)	600	A
V <sub>GS</sub>	Gate-Source Voltage	± 20	V
E <sub>AS</sub>	Single Pulsed Avalanche Energy (Note 2)	637	mJ
P <sub>D</sub>	Maximum Power Dissipation (T <sub>c</sub> =25°C)	227	W
	Derating Factor above 25°C	1.26	W/°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to +175	°C
T <sub>STG</sub>	Storage Temperature Range	-55 to +175	°C

### Thermal Characteristics

Symbol	Parameter	Max.	Units
R <sub>th j-c</sub>	Thermal Resistance, Junction to case	0.66	°C/W
R <sub>th c-s</sub>	Thermal Resistance, Case to Sink	0.5	°C/W
R <sub>th j-a</sub>	Thermal Resistance, Junction to Ambient	62.0	°C/W

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	90	-	-	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =72V, V <sub>GS</sub> =0V	-	-	1	uA
I <sub>GSS</sub>	Gate Leakage Current, Forward	V <sub>GS</sub> =20V, V <sub>DS</sub> =0V	-	-	100	nA
	Gate Leakage Current, Reverse	V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V	-	-	-100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	2	3	4	V
R <sub>DS(on)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =40A	-	4.5	5.5	mΩ
Q <sub>g</sub>	Total Gate Charge	V <sub>DD</sub> =40V	-	55	-	nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>GS</sub> =10V	-	15	-	nC
Q <sub>gd</sub>	Gate-Drain Charge	I <sub>D</sub> =50A (Note 3)	-	13	-	nC
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> =40V, V <sub>GS</sub> =10V	-	20.1	-	ns
t <sub>r</sub>	Turn-on Rise Time	I <sub>D</sub> =45A, R <sub>G</sub> =3Ω	-	38.9	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time	T <sub>C</sub> =25°C	-	45.1	-	ns
t <sub>f</sub>	Turn-off Fall Time	(Note 3)	-	22.8	-	ns
C <sub>iss</sub>	Input Capacitance -	V <sub>DS</sub> =0V	-	3086	-	pF
C <sub>oss</sub>	Output Capacitance	V <sub>GS</sub> =0V	-	1057	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance	f = 1MHz	-	26.0	-	pF

**Source-Drain Diode Characteristics** ( $T_C=25^\circ\text{C}$  unless otherwise noted)

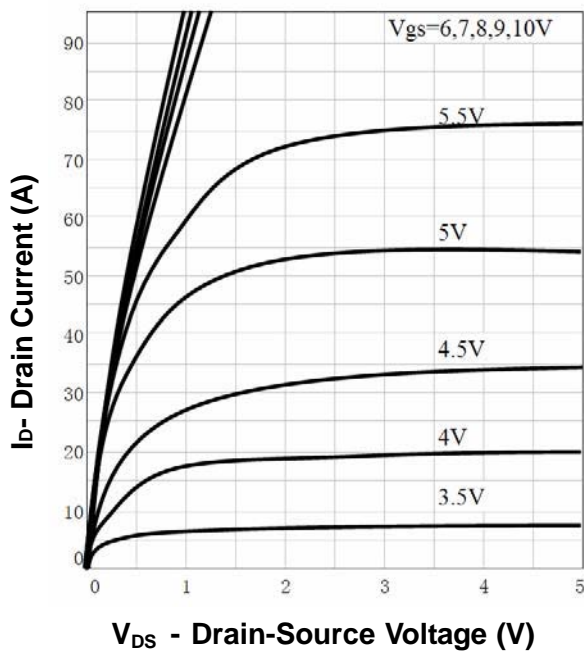
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
I <sub>S</sub>	Continuous Source Diode Forward Current		-	-	120	A
I <sub>SM</sub>	Pulsed Source Diode Forward Current (Note 1)		-	-	480	A
V <sub>SD</sub>	Forward On Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =45A	-	0.95	1.4	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> =0V, I <sub>S</sub> =45A	-	60	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge	dI <sub>F</sub> /dt = 100A/us	-	56	-	nC

## Notes:

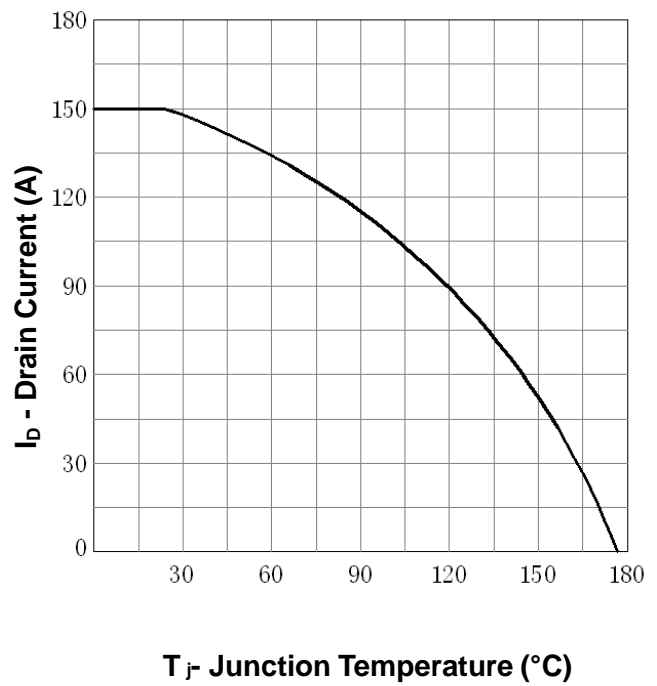
1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L=0.5mH, V<sub>DD</sub>=50V, R<sub>G</sub>=25 Ω, Starting T<sub>J</sub>=25°C
3. Pulse Width ≤ 300 us; Duty Cycle ≤ 2%

**Typical Characteristics**

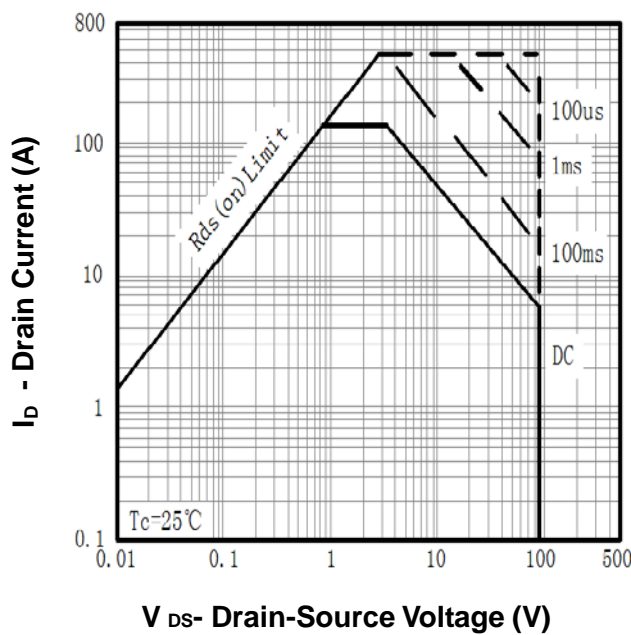
**Output Characteristics**



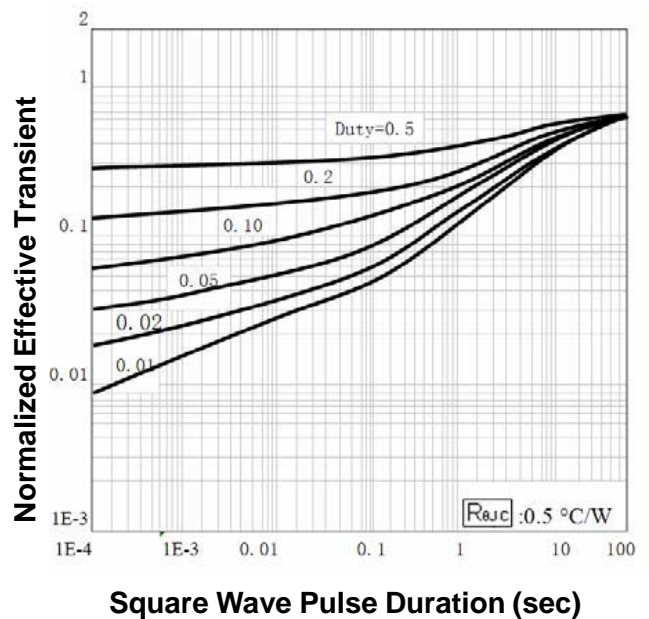
**Drain Current**



**Safe Operation Area**

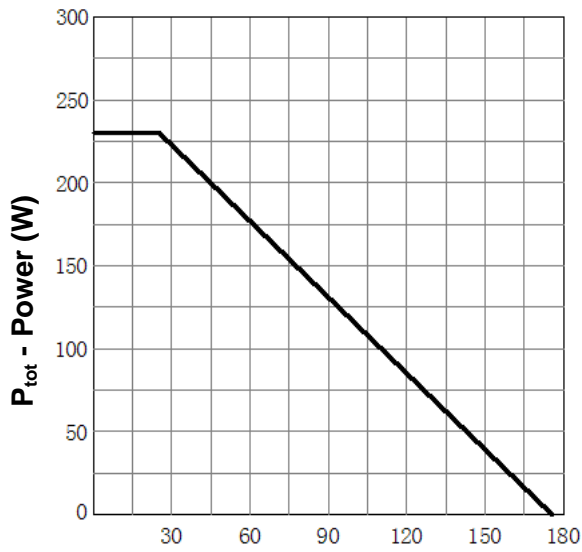


**Thermal Transient Impedance**



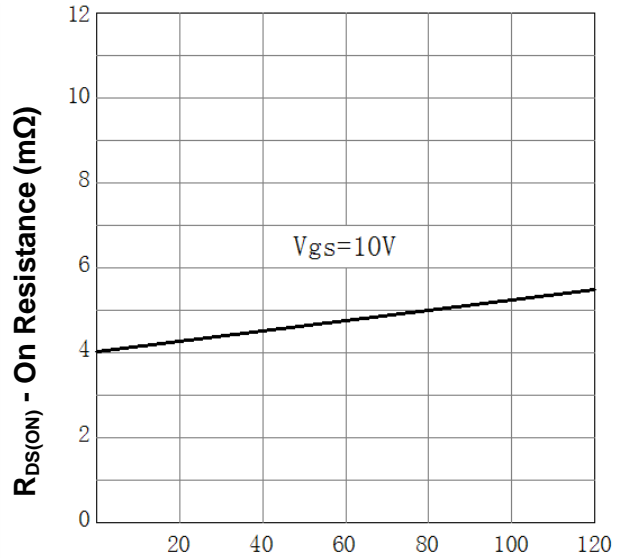
**Typical Characteristics**

**Power Dissipation**



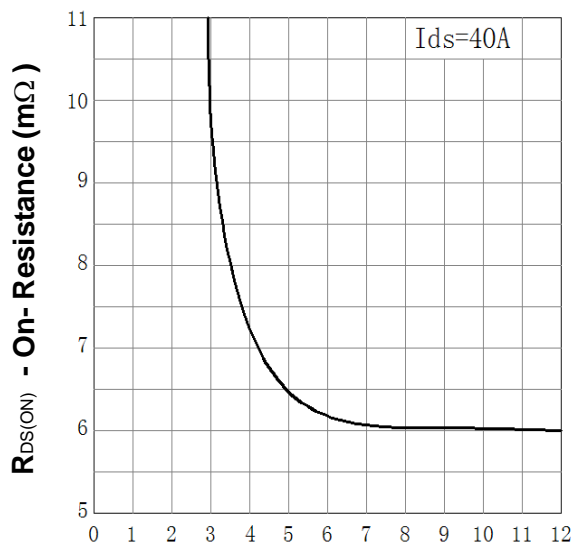
**T<sub>j</sub> - Junction Temperature (°C)**

**Drain-Source On Resistance**



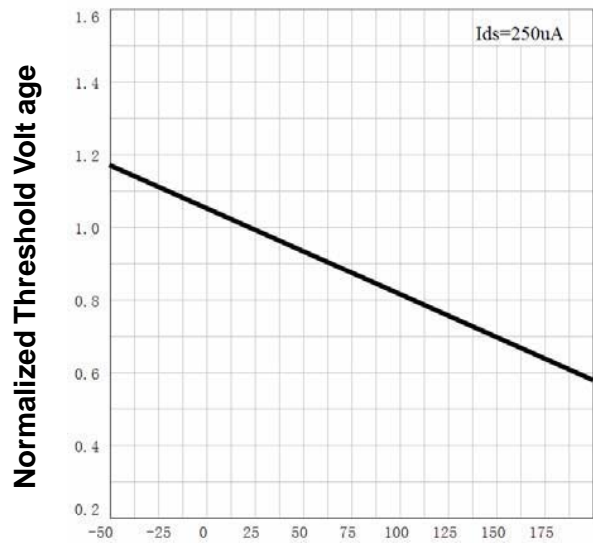
**I<sub>D</sub> - Drain Current (A)**

**Drain-Source On Resistance**



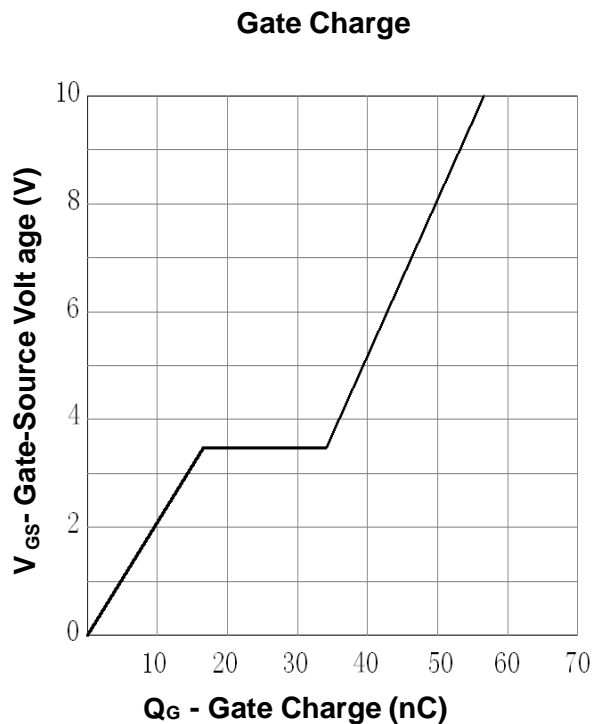
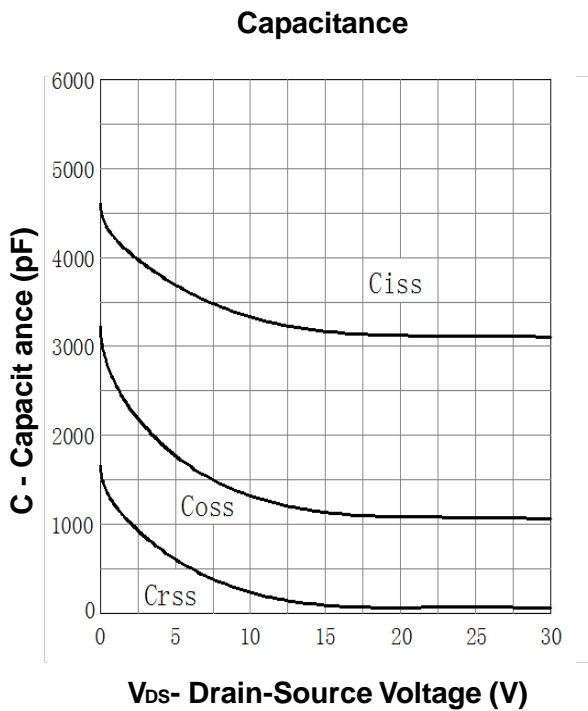
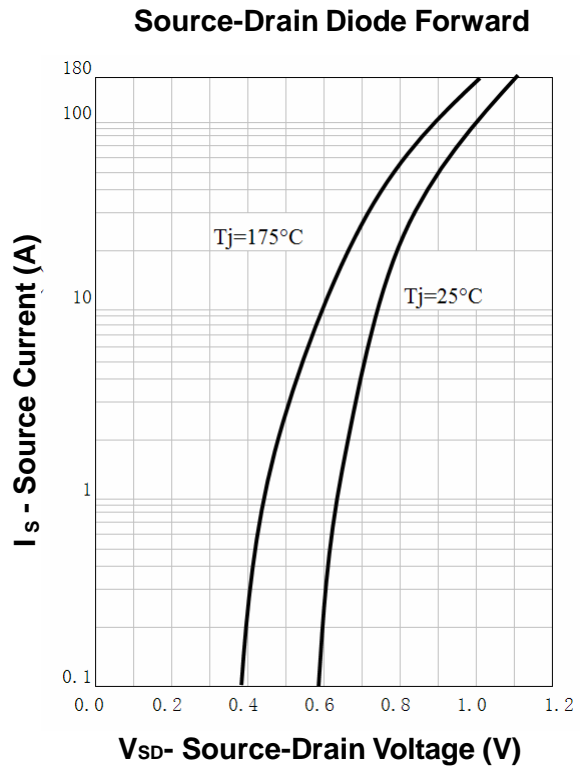
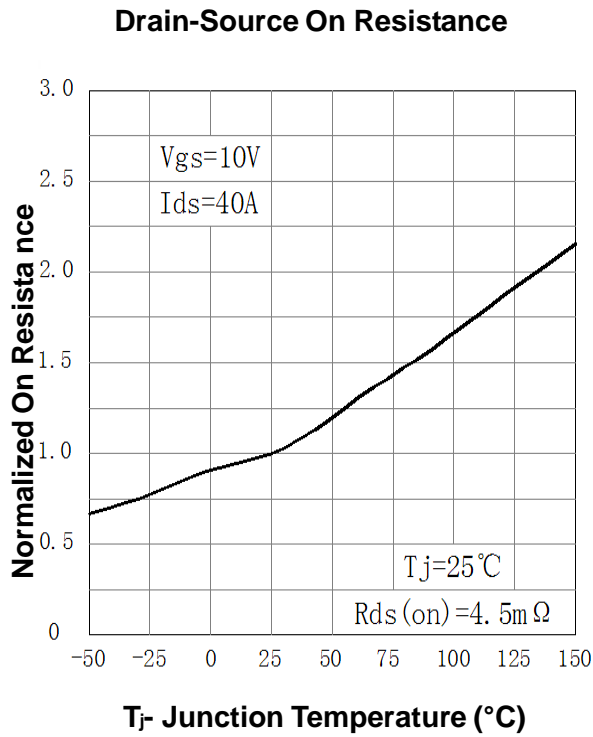
**V<sub>GS</sub> - Gate-Source Voltage (V)**

**Gate Threshold Voltage**

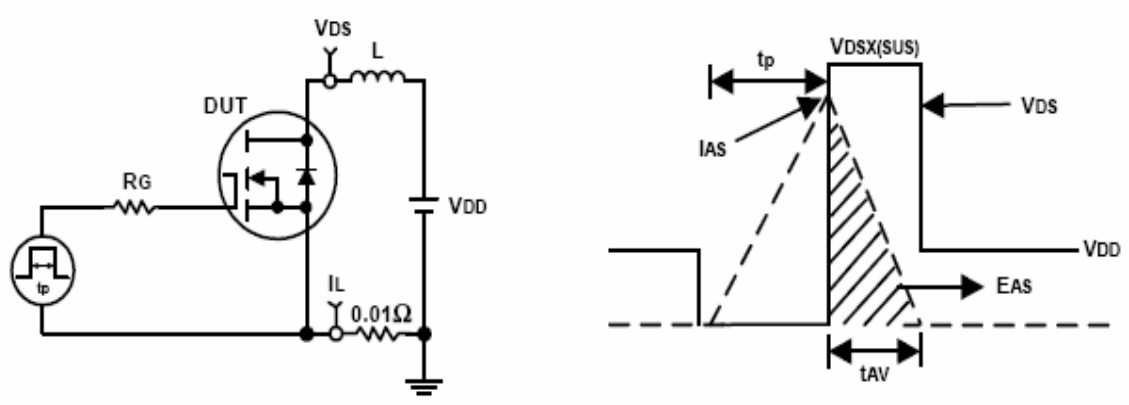


**T<sub>j</sub> - Junction Temperature (°C)**

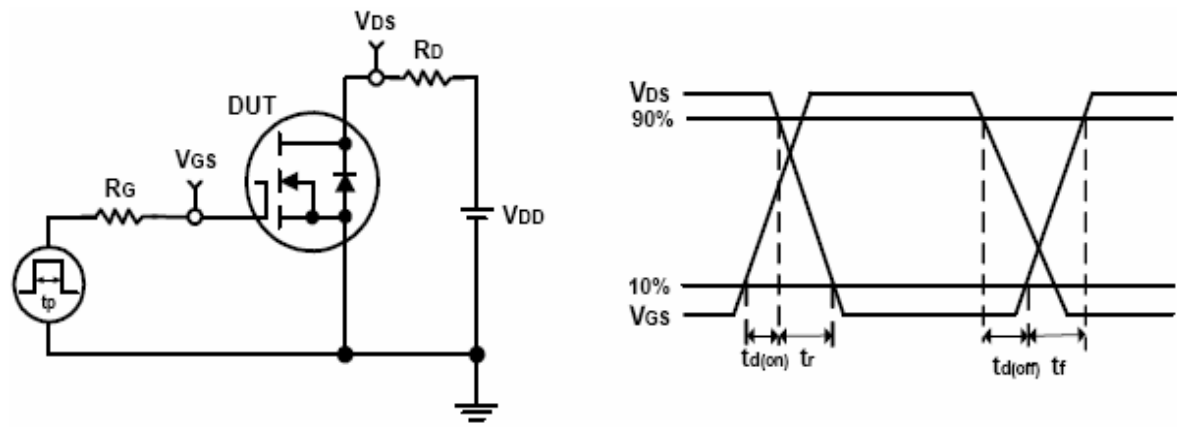
**Typical Characteristics**



### Avalanche Test Circuit and Waveforms



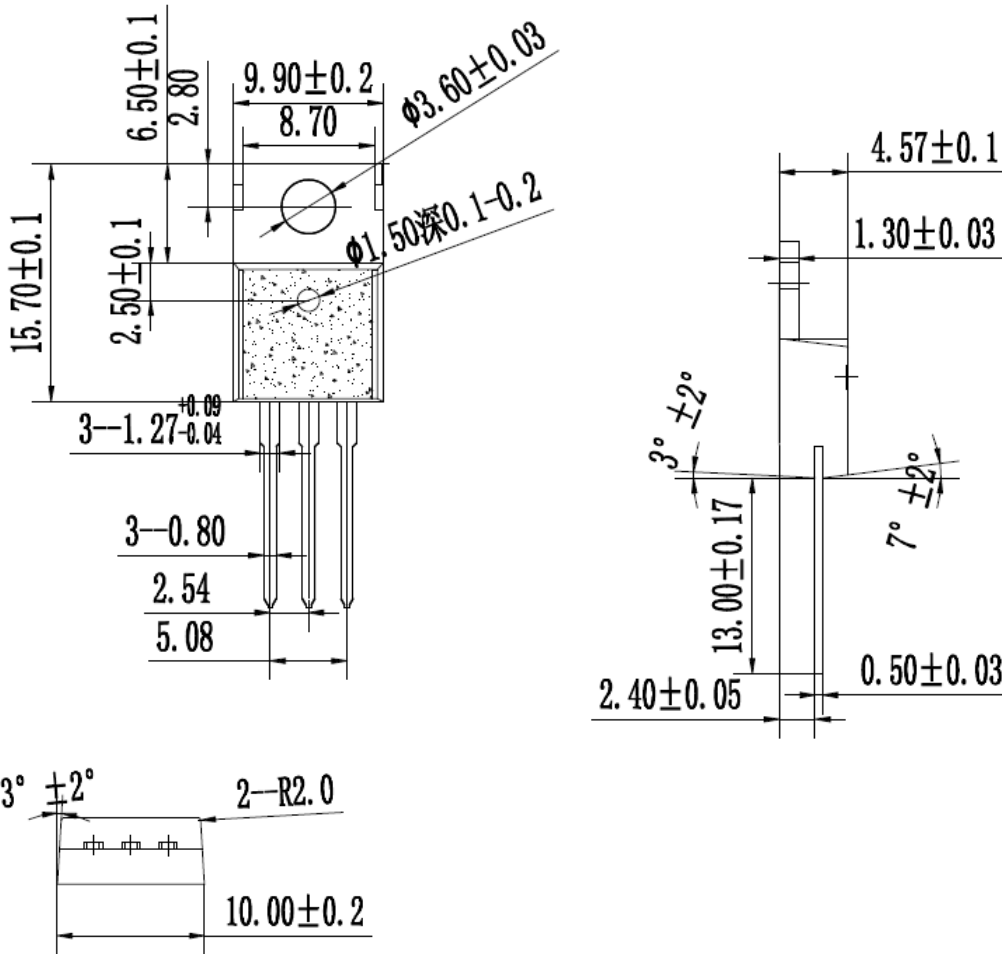
### Switching Time Test Circuit and Waveforms



**Package Outline**

Dimensions are shown in millimeters

R: TO220



S: TO263 (D<sup>2</sup>PAK)

