

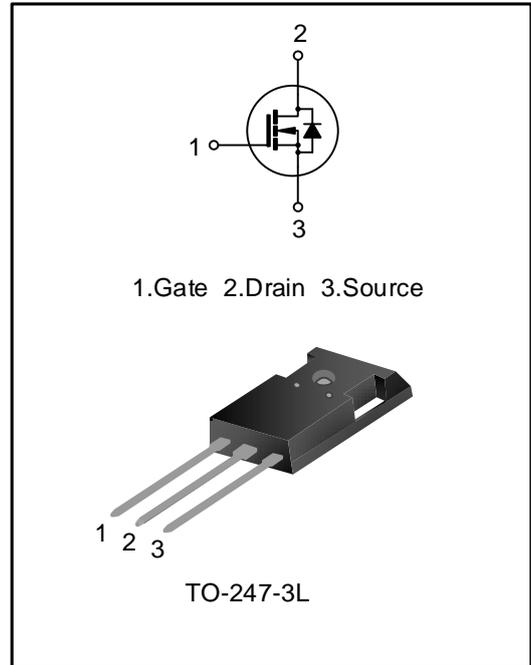
## 47A, 600V SUPER JUNCTION MOS POWER TRANSISTOR

### DESCRIPTION

SVSP60R070P7HD4 is an N-channel enhancement mode high voltage power MOSFETs produced using Silan's super junction MOS technology. It achieves low conduction loss and switching losses. It leads the design engineers to their power converters with high efficiency, high power density, and superior thermal behavior. Furthermore, it's universal applicable, i.e., suitable for hard and soft switching topologies.

### FEATURES

- ◆ 47A, 600V,  $R_{DS(on)(typ.)} = 57m\Omega @ V_{GS}=10V$
- ◆ New revolutionary high voltage technology
- ◆ Ultra low gate charge
- ◆ Periodic avalanche rated
- ◆ Extreme dv/dt rated
- ◆ High peak current capability
- ◆ 100% avalanche tested
- ◆ Pb-free lead plating
- ◆ RoHS compliant



### KEY PERFORMANCE PARAMETERS

Characteristics	Ratings	Unit
$V_{DS}$	600	V
$V_{GS(th)}$	3.0~5.0	V
$R_{DS(on),max.}$	70	$m\Omega$
$I_{D,pulse}$	160	A
$Q_g,typ.$	97	nC

### ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SVSP60R070P7HD4	TO-247-3L	P60R070HD4	Halogen free	Tube

**ABSOLUTE MAXIMUM RATINGS (UNLESS OTHERWISE NOTED, T<sub>J</sub>=25°C)**

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Drain-source Voltage	V <sub>DS</sub>	--	--	--	600	V
Gate-source Voltage (Static)	V <sub>GS</sub>	--	-20	--	20	V
Gate-source Voltage (Dynamic)	V <sub>GS</sub>	AC(f>1 Hz)	-30	--	30	V
Drain Current	I <sub>D</sub>	T <sub>C</sub> =25°C	--	--	47	A
		T <sub>C</sub> =100°C	--	--	29	A
Drain Current Pulsed (Note 1)	I <sub>DM</sub>	T <sub>C</sub> =25°C	--	--	160	A
Power Dissipation (Note 2)	P <sub>D</sub>	T <sub>C</sub> =25°C	--	--	357	W
Single Pulsed Avalanche Energy	E <sub>AS</sub>	L=79mH, V <sub>DD</sub> =100V, R <sub>G</sub> =25Ω, starting temperature T <sub>J</sub> =25°C	--	--	1664	mJ
Single Pulsed Current	I <sub>AS</sub>	--	--	--	6.0	A
Reverse Diode dv/dt	dv/dt	V <sub>DS</sub> =0~400V, I <sub>SD</sub> ≤ I <sub>S</sub> , T <sub>J</sub> =25°C	--	--	50	V/ns
MOS dv/dt Ruggedness	dv/dt	V <sub>DS</sub> =0~400V	--	--	50	V/ns
Operation Junction Temperature Range	T <sub>J</sub>	--	-55	--	150	°C
Storage Temperature Range	T <sub>stg</sub>	--	-55	--	150	°C
Continuous Diode Forward Current	I <sub>S</sub>	T <sub>C</sub> =25°C, integral reverse P-N junction diode in the MOSFET	--	--	47	A
Diode Pulse Current	I <sub>S,pulse</sub>		--	--	160	A
Maximum Diode Commutation Speed	di/dt	V <sub>DS</sub> =0~400V, I <sub>SD</sub> ≤ I <sub>S</sub> , T <sub>J</sub> =25°C	--	--	900	A/μs

**THERMAL CHARACTERISTICS**

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Thermal Resistance, Junction-case, Bottom	R <sub>θJC</sub>	--	--	--	0.35	°C/W
Thermal Resistance, Junction-ambient	R <sub>θJA</sub>	--	--	--	50	°C/W
Soldering Temperature (in line)	T <sub>sold</sub>	15 <sub>-0</sub> <sup>+2</sup> sec, 1time	--	--	260	°C

## ELECTRICAL CHARACTERISTICS (UNLESS OTHERWISE NOTED, $T_J=25^{\circ}\text{C}$ )

### Static characteristics

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Drain-source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	600	--	--	V
Drain-source Leakage Current	$I_{DSS}$	$V_{DS}=600V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	--	--	1.0	$\mu A$
		$V_{DS}=600V, V_{GS}=0V, T_J=125^{\circ}\text{C}$	--	7.0	--	$\mu A$
Gate-source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	--	--	$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	3.0	--	5.0	V
Static Drain-source On State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=23.5A, T_J=25^{\circ}\text{C}$	--	57	70	m $\Omega$
		$V_{GS}=10V, I_D=23.5A, T_J=150^{\circ}\text{C}$	--	116	--	
Gate Resistance	$R_G$	$f=1\text{MHz}$	--	1.6	--	$\Omega$

### Dynamic characteristics

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Input Capacitance	$C_{iss}$	$f=1\text{MHz}, V_{GS}=0V, V_{DS}=200V$	--	4142	--	pF
Output Capacitance	$C_{oss}$		--	123	--	
Reverse Transfer Capacitance	$C_{rss}$		--	7.2	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=400V, V_{GS}=10V, R_G=5.3\Omega, I_D=26.3A$ (Notes 3, 4)	--	38	--	ns
Turn-on Rise Time	$t_r$		--	49	--	
Turn-off Delay Time	$t_{d(off)}$		--	85	--	
Turn-off Fall Time	$t_f$		--	28	--	
Total Gate Charge	$Q_g$	$V_{DD}=480V, V_{GS}=10V, I_D=26.3A$ (Notes 3, 4)	--	97	--	nC
Gate-source Charge	$Q_{gs}$		--	33	--	
Gate-drain Charge	$Q_{gd}$		--	43	--	
Gate-plateau Voltage	$V_{plateau}$		--	7.5	--	V

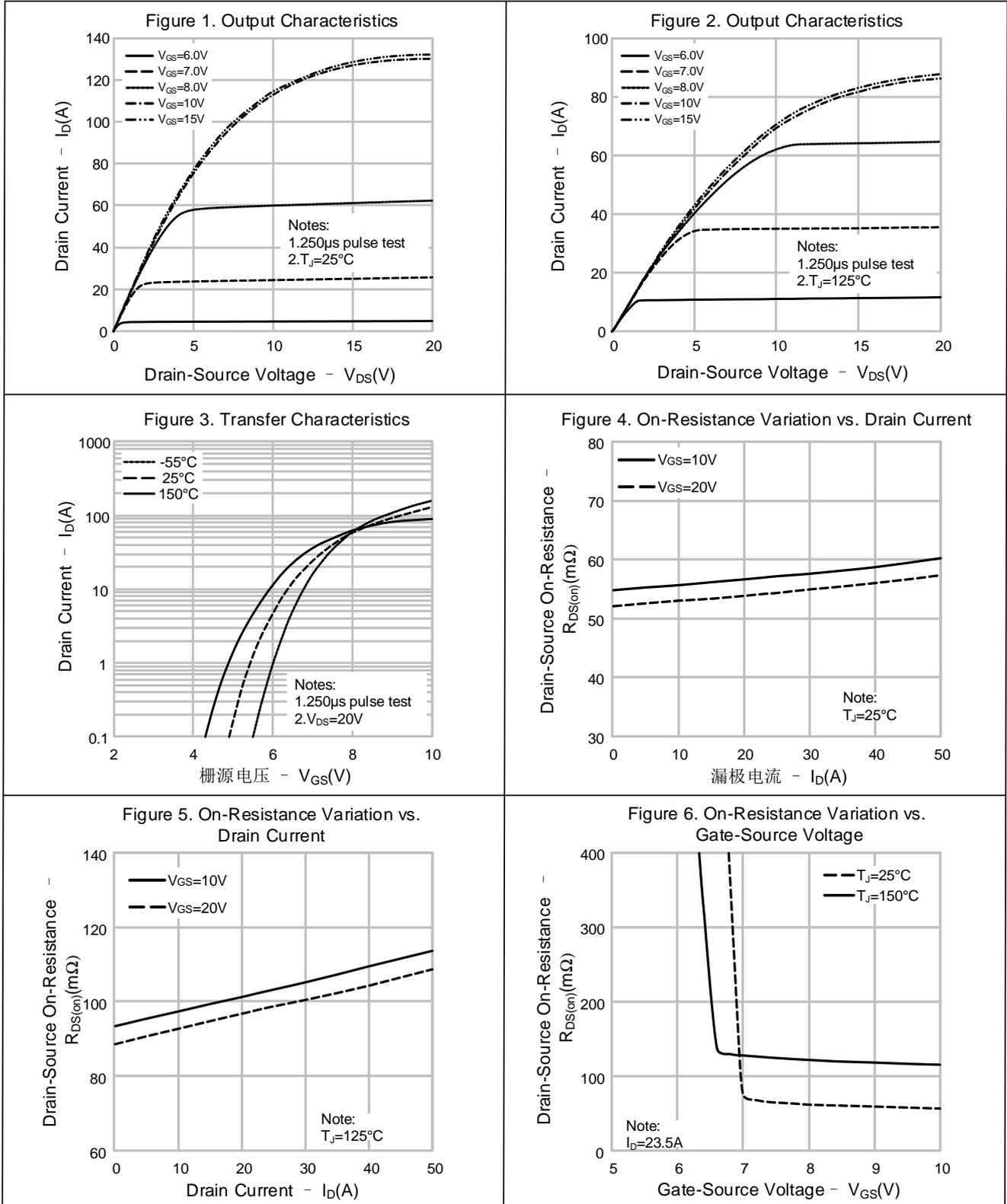
### Reverse diode characteristics

Characteristics	Symbol	Test conditions	Ratings			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	$V_{SD}$	$I_S=26.3A, V_{GS}=0V$	--	--	1.4	V
Reverse Recovery Time	$T_{rr}$	$I_S=26.3A, V_{GS}=0V, V_R=400V, di_f/dt=100A/\mu s$ (Note 3)	--	131	--	ns
Reverse Recovery Charge	$Q_{rr}$		--	0.8	--	$\mu C$
Reverse Recovery Peak Current	$I_{rrm}$		--	12	--	A

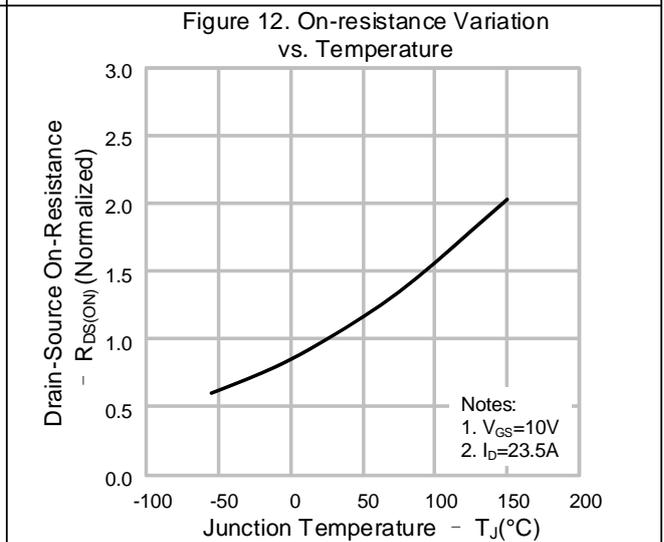
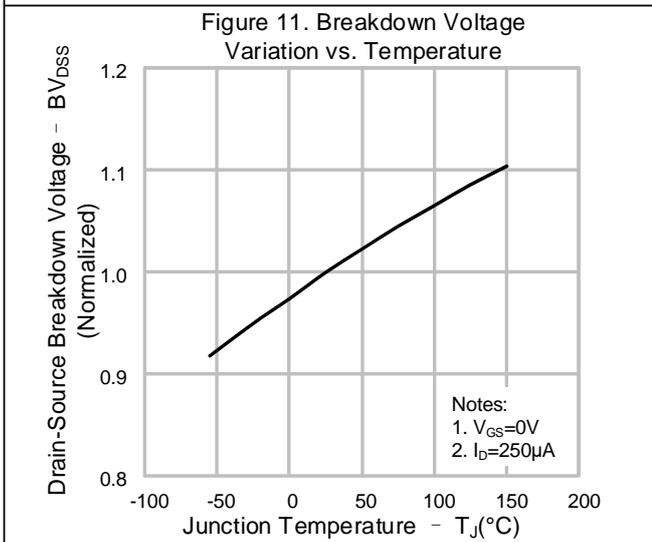
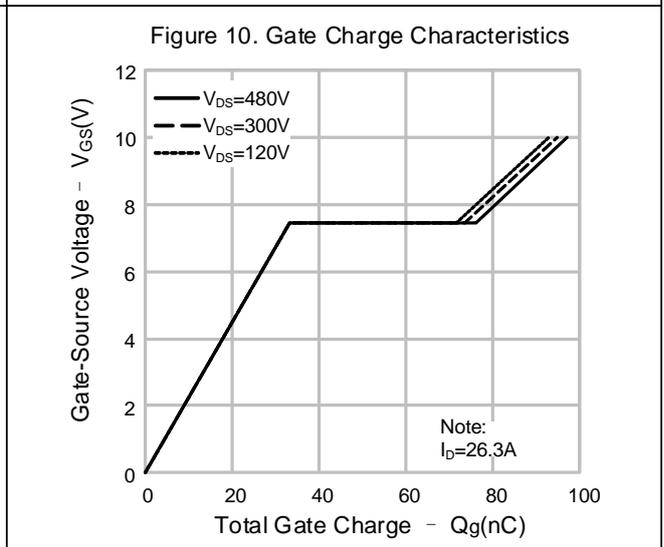
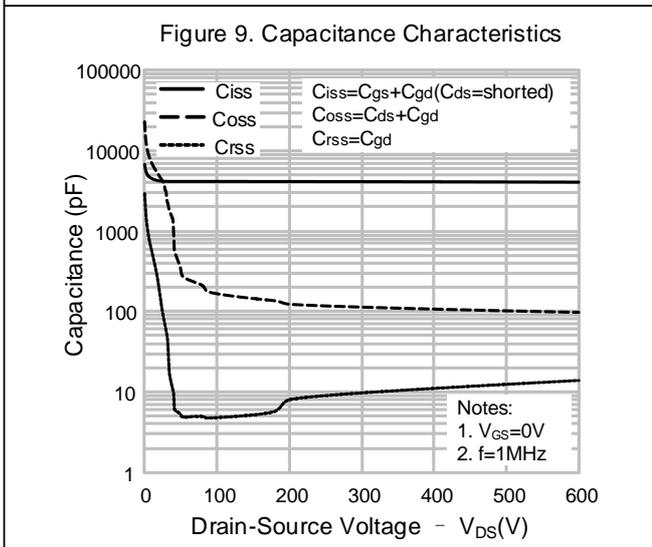
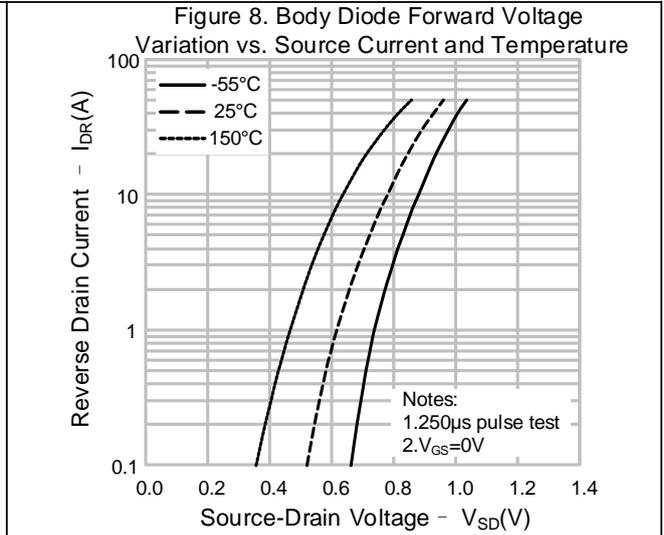
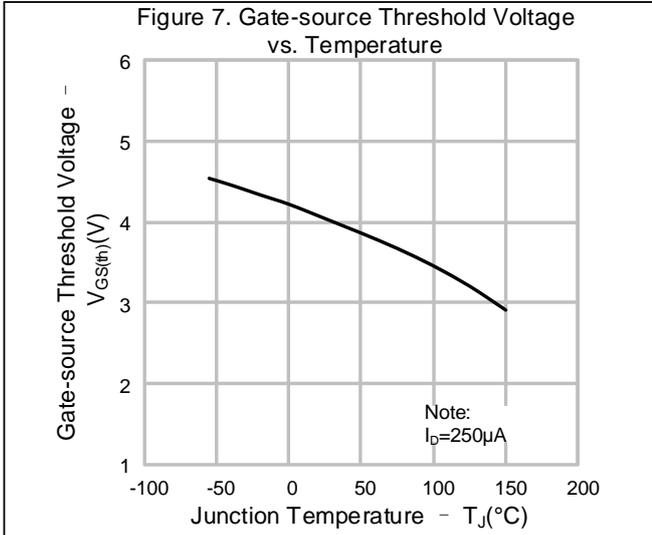
### Notes:

1. Pulse time  $5\mu s$ ;
2. The dissipation power will change with temperature, derating above  $25^{\circ}\text{C}$ :  $2.86W/^{\circ}\text{C}$ ;
3. Pulse Test: Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$ ;
4. Essentially independent of operating temperature.

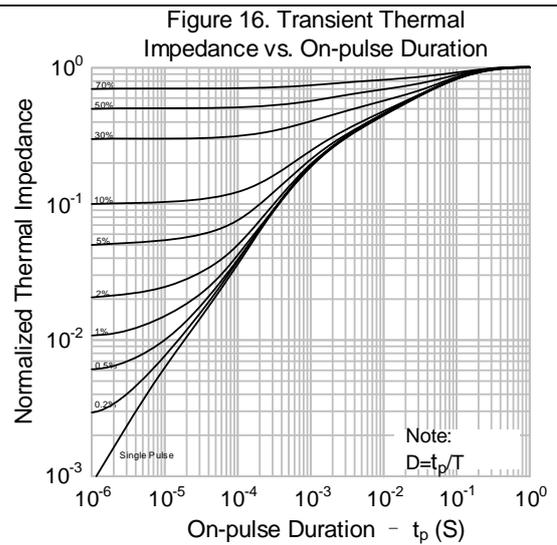
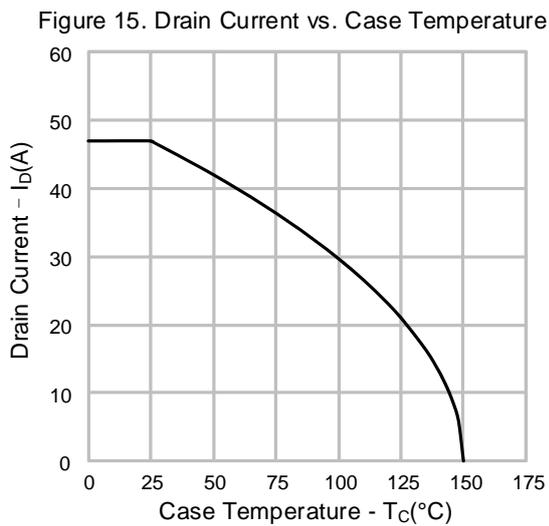
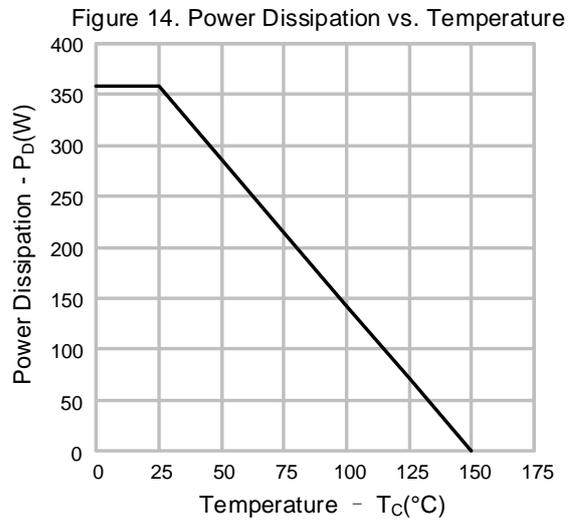
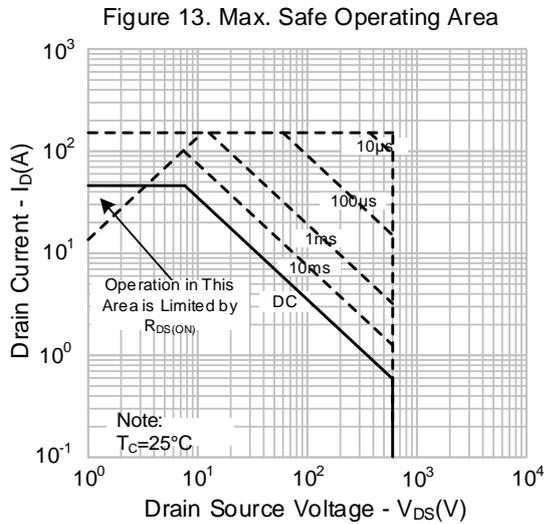
**TYPICAL CHARACTERISTICS**



**TYPICAL CHARACTERISTICS (CONTINUED)**

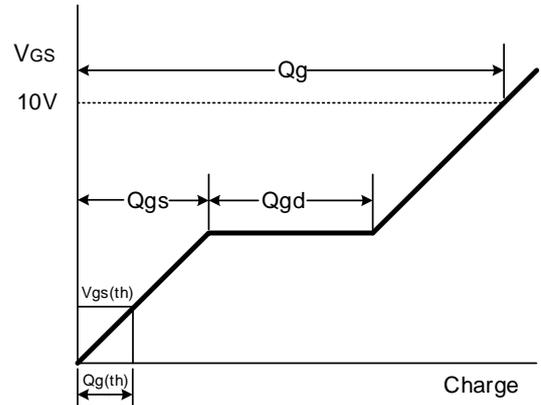
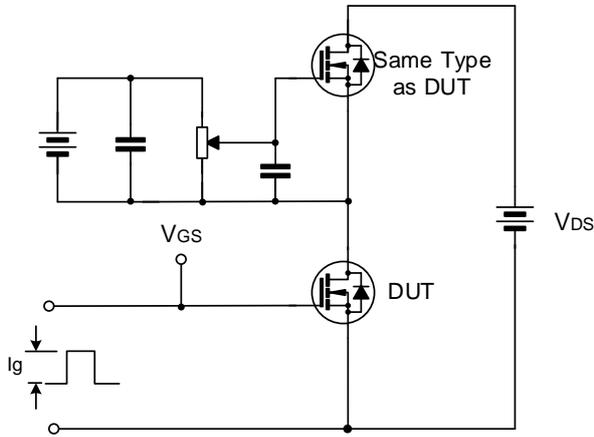


**TYPICAL CHARACTERISTICS (CONTINUED)**

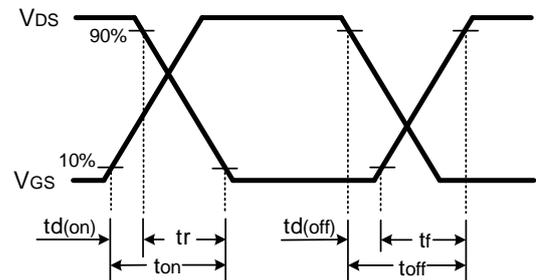
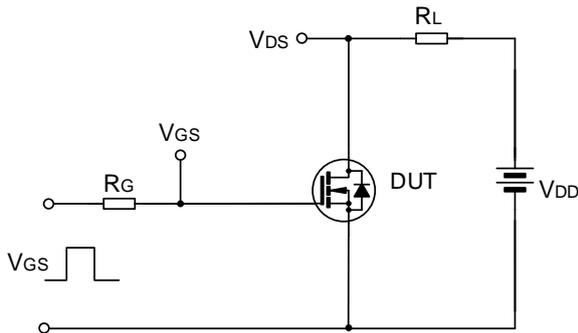


**TYPICAL TEST CIRCUIT**

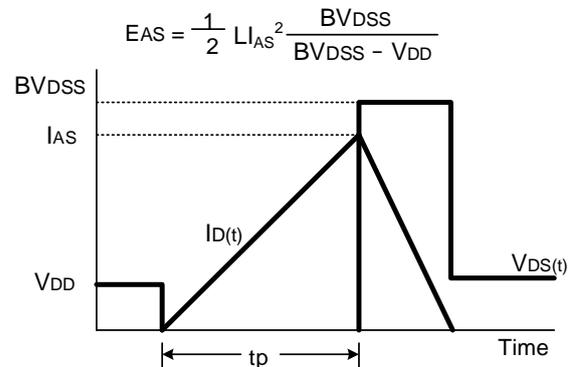
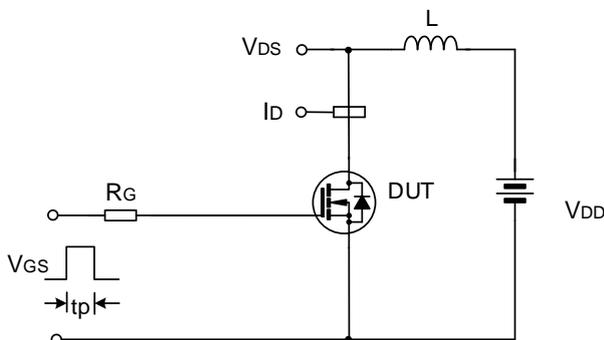
Gate Charge Test Circuit & Waveform



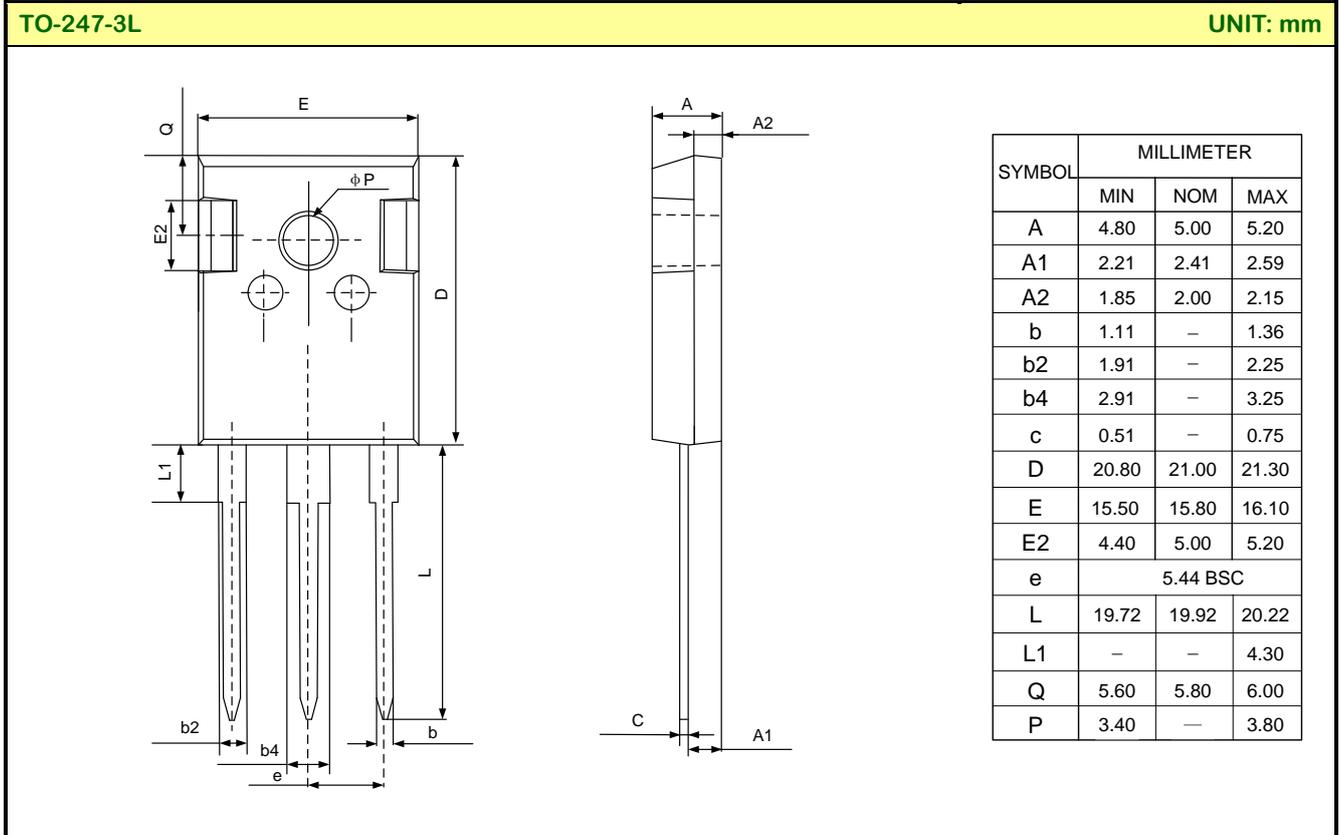
Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



**PACKAGE OUTLINE**



**MOS DEVICES OPERATE NOTES:**

Electrostatic charges may exist in many things. Please take following preventive measures to prevent effectively the MOS electric circuit as a result of the damage which is caused by discharge:

- The operator must put on wrist strap which should be earthed to against electrostatic.
- Equipment cases should be earthed.
- All tools used during assembly, including soldering tools and solder baths, must be earthed.
- MOS devices should be packed in antistatic/conductive containers for transportation.

## Important notice :

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Rev.: 1.0

Revision History:

1. First release
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