

N-Channel, 600V, 7A, POWER MOSFET

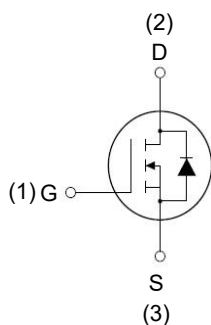
Features

- ✧ New technology for high voltage device
- ✧ Low on-resistance and low conduction losses
- ✧ Small package : TO-252
- ✧ Ultra Low Gate Charge cause lower driving requirements
- ✧ 100% Avalanche Tested

V_{DS} (V)	Typical $R_{DS(on)}$ (Ω)
600	1.06 @ $V_{GS}=10V$

Applications

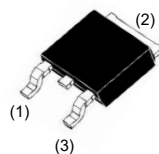
- ✧ LED power supplies
- ✧ Cell Phone Charger
- ✧ Standby Power



Circuit Diagram

Mechanical Data

- ✧ Case : Molded plastic body
- ✧ Terminals : Solder plated, solderable per MIL-STD-750,Method 2026
- ✧ Polarity : As marked
- ✧ RoHS/WEEE Compliant



TO-252

Absolute Maximum Rating at $T_A = 25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Value	Units
Drain-Source Voltage ($V_{GS}=0V$)	V_{DS}	600	V
Gate-Source Voltage ($V_{DS}=0V$) AC ($f>1\text{ Hz}$)	V_{GS}	± 30	V
Continuous Drain Current	I_D (DC)	7	A
Power Dissipation	P_D	147	W
Thermal Resistance, Junction-to-Case (Maximum)	$R_{\theta JC}$	0.85	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient (Maximum)	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$
Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55~ +150	$^\circ\text{C}$

Electrical Characteristics at $T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise specified

Parameter	Symbol	Tests conditions	Min	Typ	Max	Units
Off –Characteristics						
Drain-Source Voltage	BV_{DSS}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	600	-	-	V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\mu\text{A}$, referenced to 25°C	-	0.65	-	$\text{V}/^{\circ}\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=600\text{V}$, $V_{GS}=0\text{V}$, $T_C=25^{\circ}\text{C}$	-	-	1	μA
Gate-body leakage current, forward	I_{GSSF}	$V_{DS}=0\text{V}$, $V_{GS}=30\text{V}$	-	-	80	nA
Gate-body leakage current, reverse	I_{GSSR}	$V_{DS}=0\text{V}$, $V_{GS}=-30\text{V}$	-	-	-80	nA
On-Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D=250\mu\text{A}$	2.0	-	4.0	V
Static Drain-Source On-Resistance ⁶	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=3.5\text{A}$	-	1.06	1.27	Ω
Forward Transconductance	g_{fs}	$V_{DS}=40\text{V}$, $I_D=3.5\text{A}$ (note 4)	-	8.2	-	S
Dynamic Characteristics						
Input capacitance	C_{iss}	$V_{DS}=25\text{V}$, $V_{GS}=0\text{V}$, $f=1.0\text{MHz}$	-	1380	1800	pF
Output capacitance	C_{oss}		-	115	150	pF
Reverse transfer capacitance	C_{rss}		-	23	30	pF

Electrical Characteristics at $T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise specified

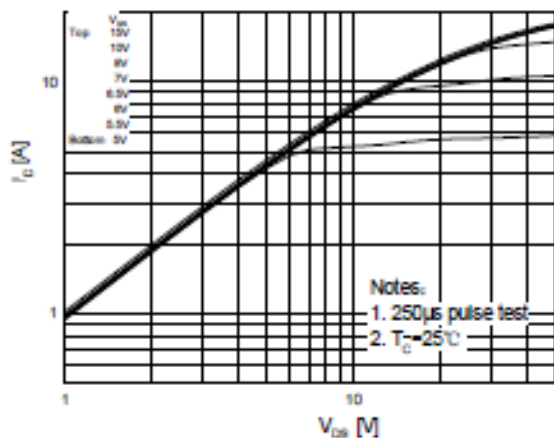
Switching Characteristics						
Turn-On delay time	$t_{d(on)}$	$V_{DD}=300V, I_D=7A, R_G=25\Omega$ (note 4, 5)	-	30	70	ns
Turn-On rise time	t_r		-	80	170	ns
Turn-Off delay time	$t_{d(off)}$		-	125	260	ns
Turn-Off Fall time	t_f		-	85	180	ns
Total Gate Charge	Q_g	$V_{DS}=480V$, $I_D=7A$ $V_{GS}=10V$ (note 4, 5)	-	54	65	nC
Gate-Source charge	Q_{gs}		-	6.8	-	nC
Gate-Drain charge	Q_{gd}		-	23	-	nC
Drain-Source Diode Characteristics and Maximum Ratings						
Maximum Continuous Drain-Source Diode Forward Current	I_S		-	-	7.0	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}		-	-	28	A
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V$, $I_S=7.0A$	-	-	1.4	V
Reverse recovery time	t_{rr}	$V_{GS}=0V$, $I_S=7.0A$ $di_F/dt=100A/\mu s$ (note 4)	-	415	-	ns
Reverse recovery charge	Q_{rr}		-	4.6	-	μC

Notes:

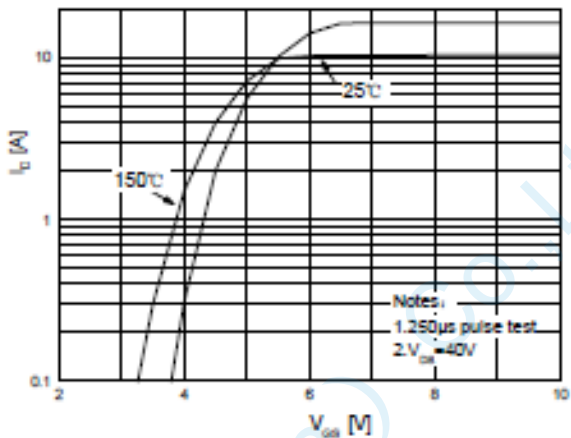
1. Pulse width limited by maximum junction temperature
2. $L=15.7mH$, $I_{AS}=7.0A$, $V_{DD}=50V$, $R_G=25\Omega$, Starting $T_J=25\text{ }^{\circ}\text{C}$
3. $I_{SD}\leq 7.0A$, $di/dt\leq 300A/\mu s$, $V_{DD}\leq BV_{DSS}$, Starting $T_J=25\text{ }^{\circ}\text{C}$
4. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$
5. Essentially independent of operating temperature
6. $R_{DS(on)}$ CP test result, typical, is 1.06Ω @ $V_{GS}=10V$, $I_D=1.0A$

Typical Characteristics at $T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise specified

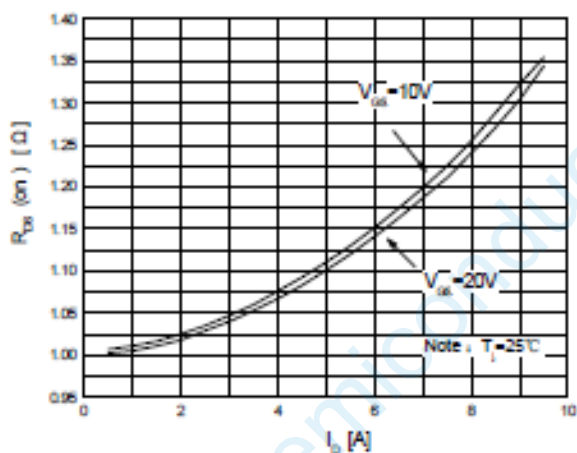
On-Region Characteristics



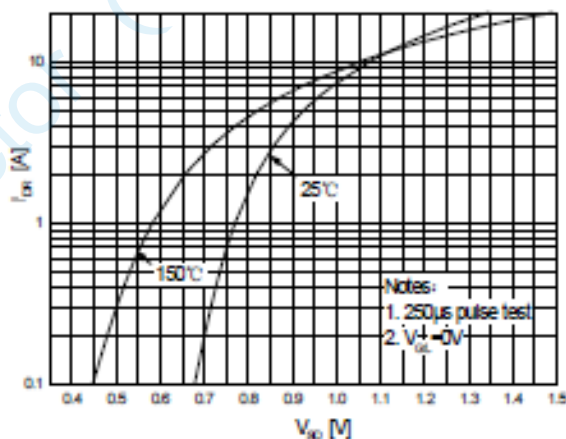
Transfer Characteristics



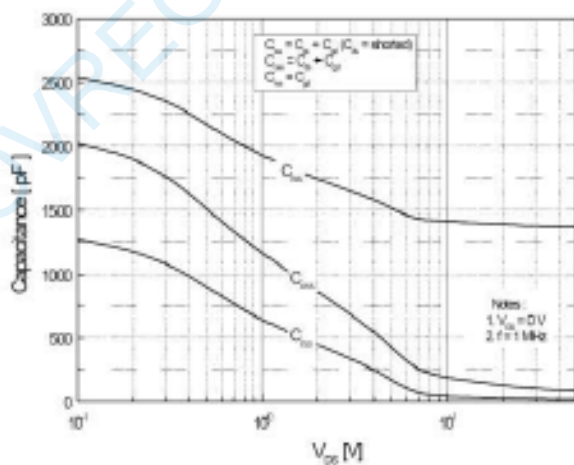
On-Resistance Variation vs. Drain Current and Gate Voltage



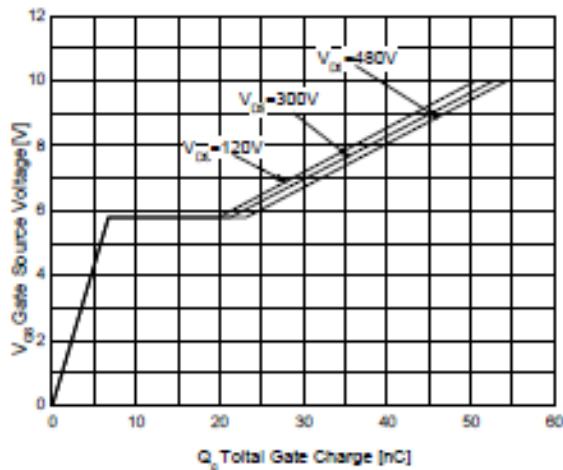
Body Diode Forward Voltage Variation vs. Source Current and Temperature



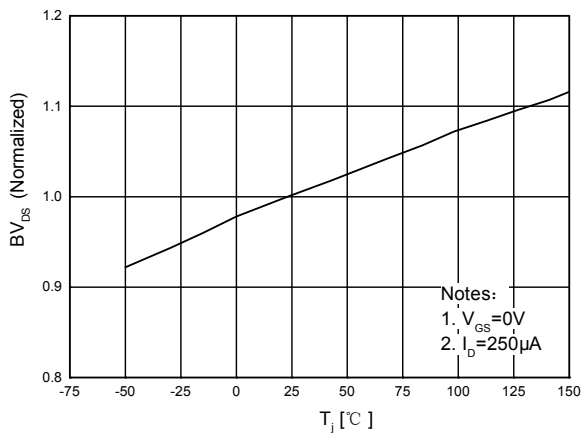
Capacitance Characteristics



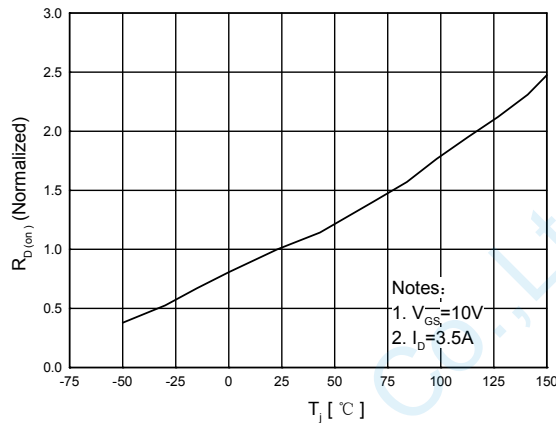
Gate Charge Characteristics



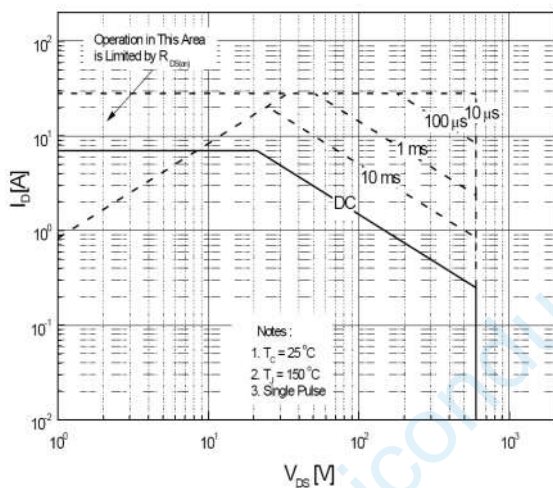
**Breakdown Voltage Variation
vs. Temperature**



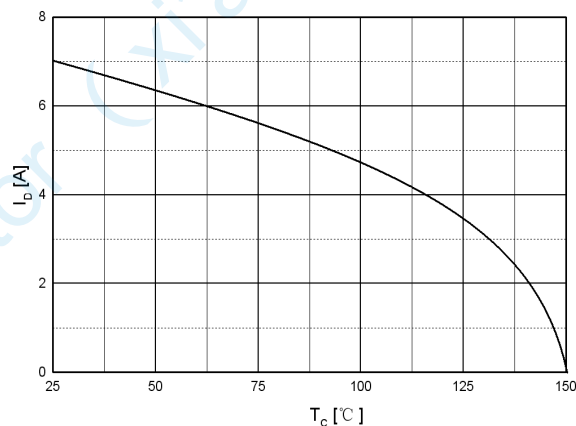
**On-Resistance Variation
vs. Temperature**



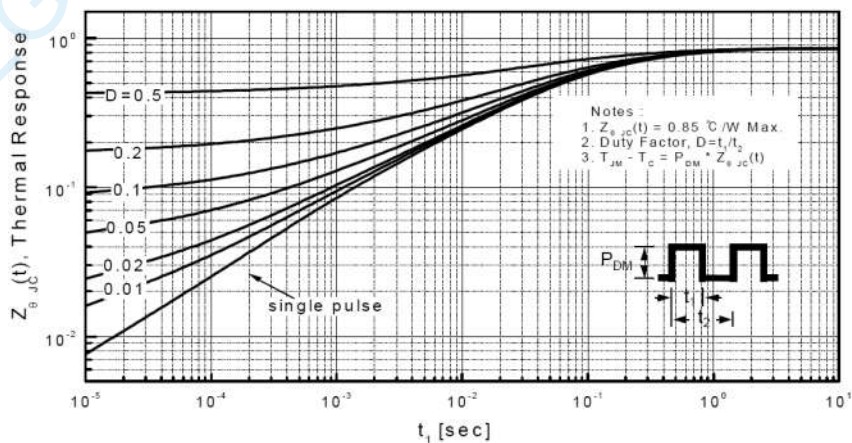
Maximum Safe Operating Area



**Maximum Drain Current
vs. Case Temperature**

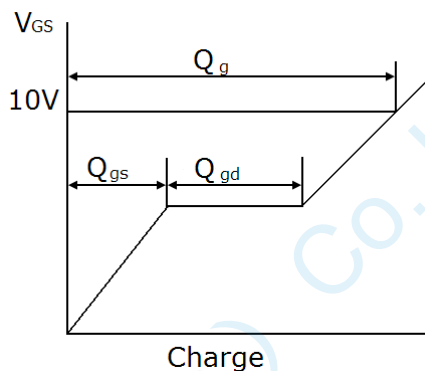
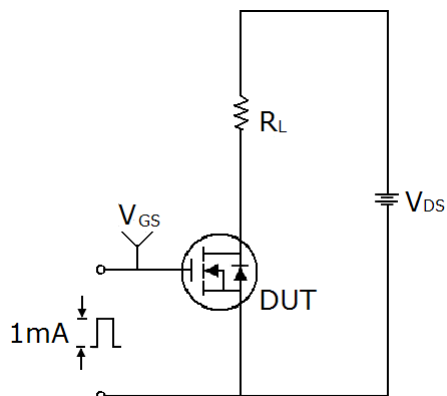


Transient Thermal Response Curve

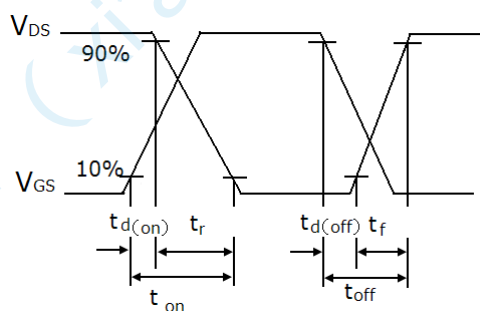
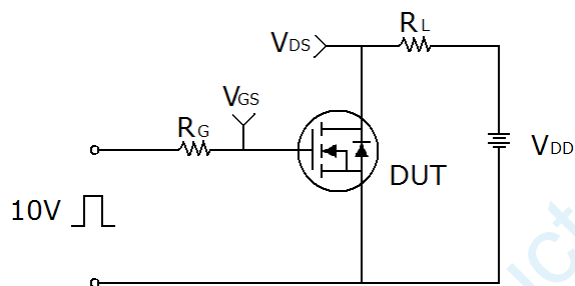


Test circuit

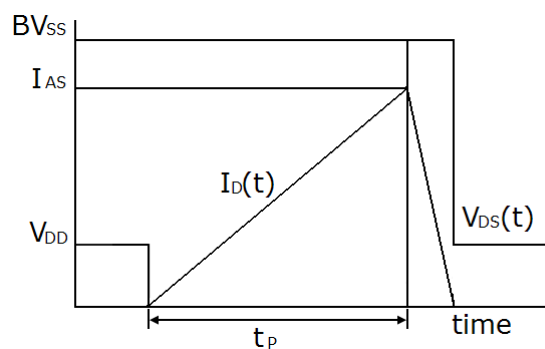
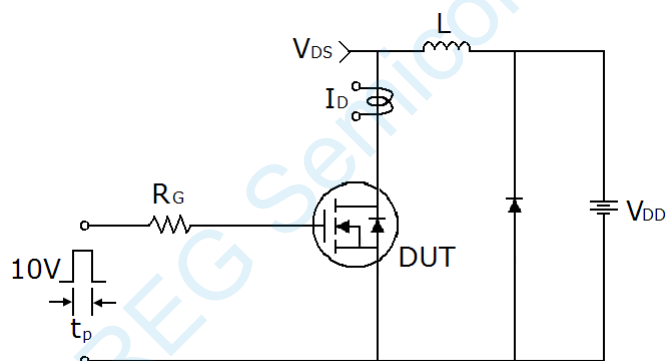
1) Gate charge test circuit & Waveform



2) Switch Time Test Circuit:

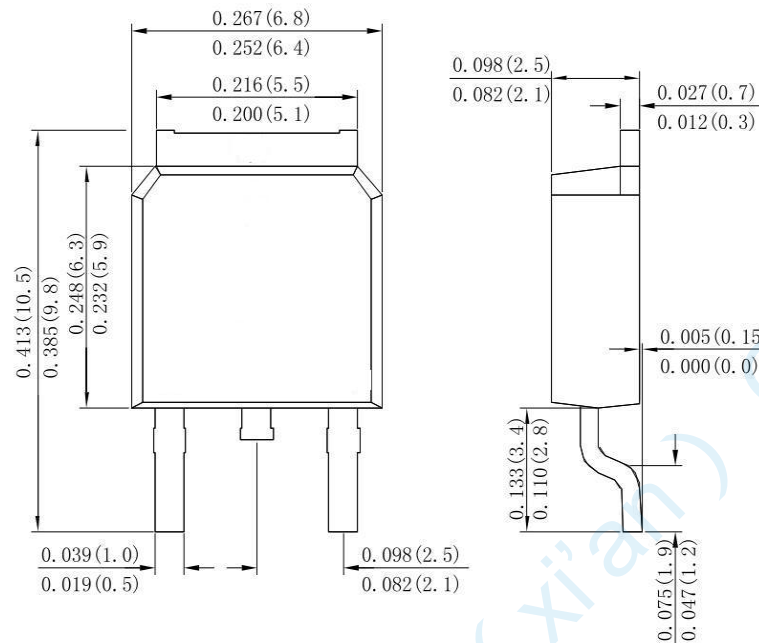


3) Unclamped Inductive Switching Test Circuit & Waveforms

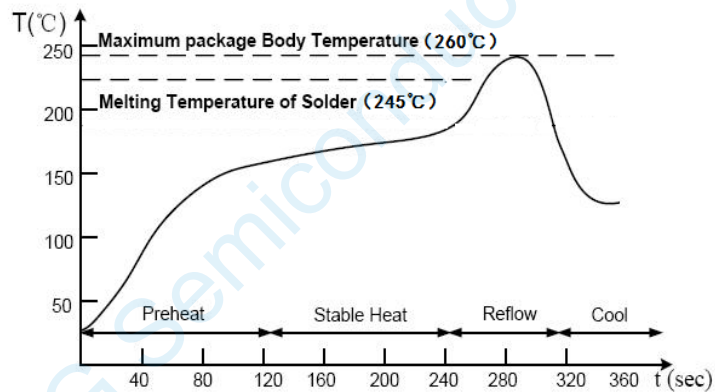


Package Information

TO-252



Suggested Soldering Temperature Profile



Note

- Recommended reflow methods: IR, vapor phase oven, hot air oven, wave solder.
- The device can be exposed to a maximum temperature of 260°C for 10 seconds.
- Devices can be cleaned using standard industry methods and solvents.
- If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

Ordering Information

Package	Reel Size	Reel DIA. (mm)	Q'TY/Reel (Kpcs)	Box Size (mm)	QTY/Box (Kpcs)	Carton Size (mm)	Q'TY/Carton (Kpcs)
TO-252	13'	330	2.5	340	5.0	360*360*360	40