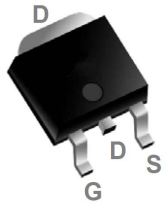
Features

- 60V/28A,
  $R_{DS(ON)}$ = 28mΩ (TYP.) @ V_{GS} = 10V
  $R_{DS(ON)}$ = 38mΩ (TYP.) @ V_{GS} = 5V
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)
- 100% UIS + R_g Tested

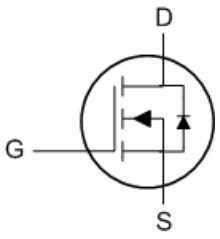
Applications

- Switching Application for Actuator.
- Converter Application in LED TV.
- Switching Application in Industry.

Pin Configuration



Top View of TO-252-2



N-Channel MOSFET

Absolute Maximum Ratings (T_A = 25°C Unless Otherwise Noted)

Symbol	Parameter		Rating	Unit
Common Ratings				
V_{DSS}	Drain-Source Voltage		60	V
V_{GSS}	Gate-Source Voltage		±20	
T_J	Maximum Junction Temperature		175	°C
T_{STG}	Storage Temperature Range		-55 to 175	°C
I_S	Diode Continuous Forward Current	T_C=25°C	12	A
I_{DP}	Pulse Drain Current Tested	T_C=25°C	96	A
		T_C=100°C	68	
I_D	Continuous Drain Current	T_C=25°C	28	A
		T_C=100°C	17	
P_D	Maximum Power Dissipation	T_C=25°C	60	W
		T_C=100°C	30	
$R_{\theta JC}$	Thermal Resistance-Junction to Case		2.5	°C/W
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient		50	°C/W
E_{AS}	Drain-Source Avalanche Energy	L=0.5mH	22	mJ

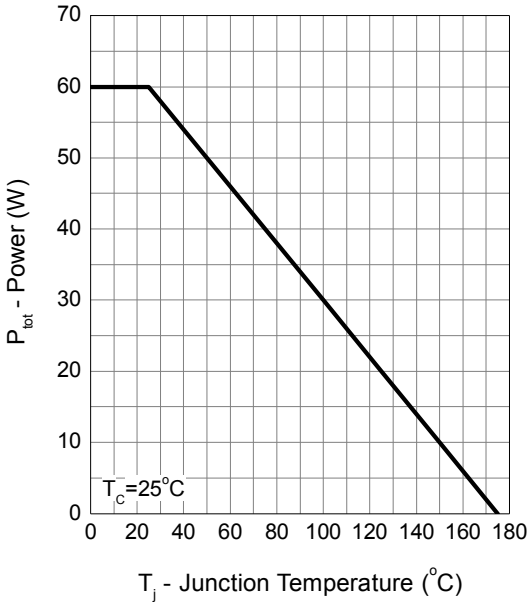
Electrical Characteristics (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=250μA	60	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=48V, V_{GS}=0V	-	-	1	μA
		T_J=125°C	-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	1	2	3	V
I_{GSS}	Gate Leakage Current	V_{GS}=±16V, V_{DS}=0V	-	-	±10	μA
$R_{DS(ON)}$ [a]	Drain-Source On-state Resistance	V_{GS}=10V, I_{DS}=12A	-	28	40	mΩ
		V_{GS}=5V, I_{DS}=11A	-	38	50	
Diode Characteristics						
V_{SD} [a]	Diode Forward Voltage	I_{SD}=12A, V_{GS}=0V	-	0.8	1.3	V
t_{rr}	Reverse Recovery Time	I_{DS}=12A, dI_{SD}/dt=100A/μs	-	30	-	ns
Q_{rr}	Reverse Recovery Charge		-	35	-	nC
Dynamic Characteristics [b]						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=30V, Frequency=1.0MHz	-	530	-	pF
C_{oss}	Output Capacitance		-	85	-	
C_{rss}	Reverse Transfer Capacitance		-	40	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=30V, R_L=30Ω, I_{DS}=1A, V_{GEN}=10V, R_G=6Ω	-	8	15	ns
T_r	Turn-on Rise Time		-	8	15	
$t_{d(OFF)}$	Turn-off Delay Time		-	28	51	
T_f	Turn-off Fall Time		-	22	41	
Gate Charge Characteristics [b]						
Q_g	Total Gate Charge	V_{DS}=30V, V_{GS}=10V, I_{DS}=12A	-	12	17	nC
Q_{gs}	Gate-Source Charge		-	3	-	
Q_{gd}	Gate-Drain Charge		-	3	-	

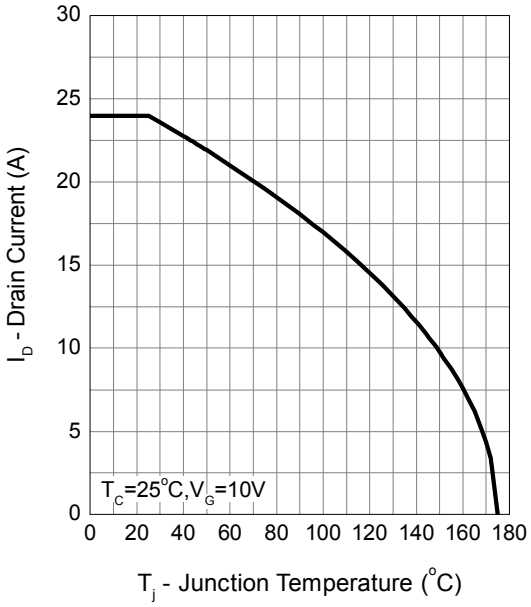
Note a： Pulse test ; pulse width≤300μs, duty cycle≤2%.
Note b：Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

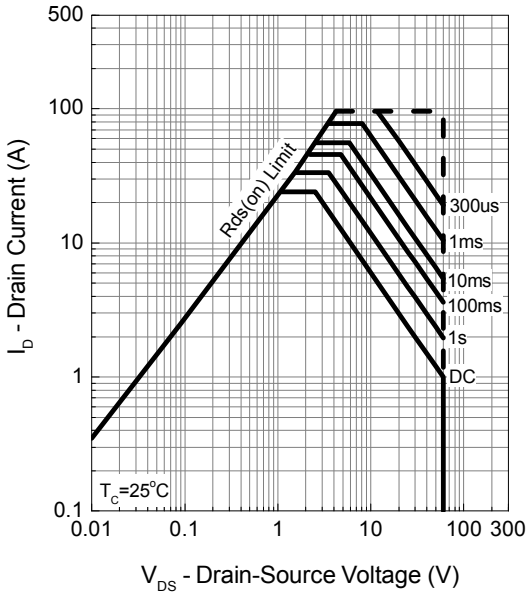
Power Dissipation



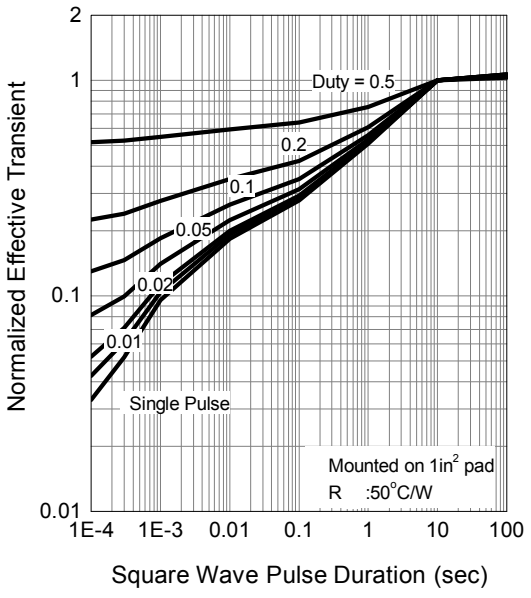
Drain Current



Safe Operation Area

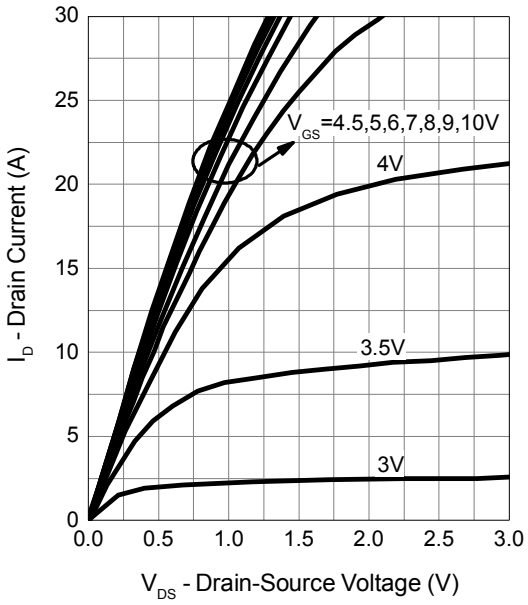


Thermal Transient Impedance

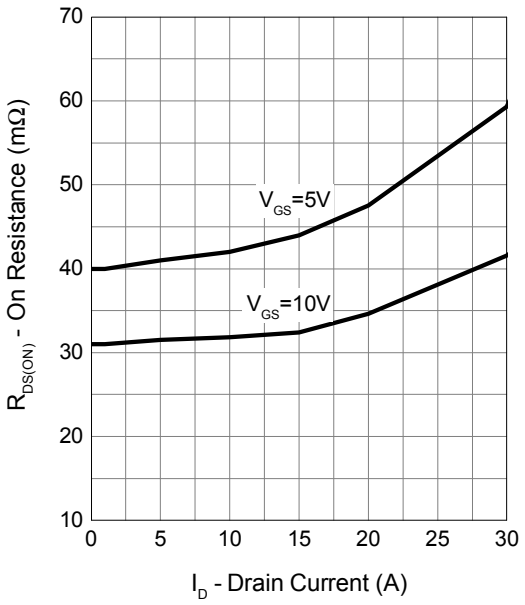


Typical Operating Characteristics (Cont.)

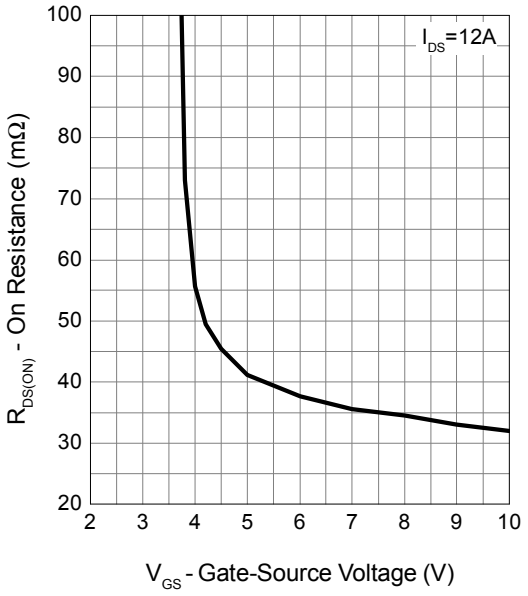
Output Characteristics



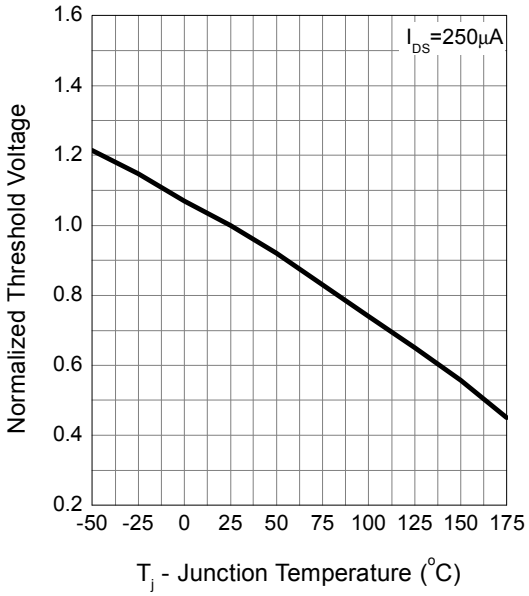
Drain-Source On Resistance



Gate-Source On Resistance

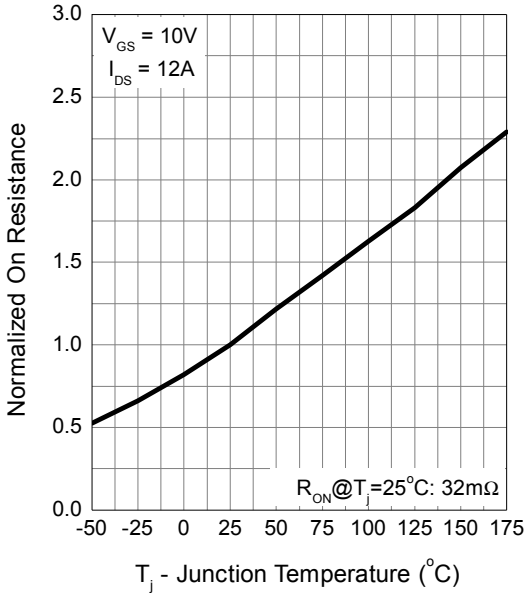


Gate Threshold Voltage

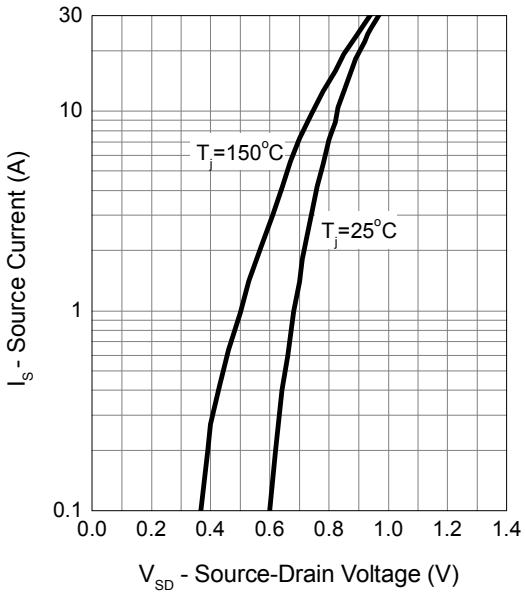


Typical Operating Characteristics (Cont.)

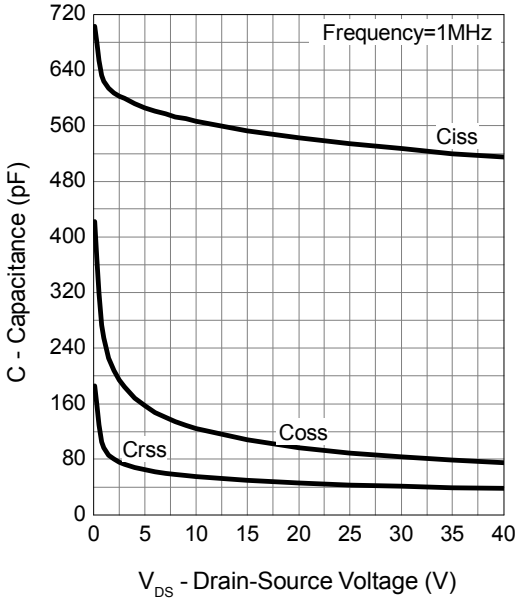
Drain-Source On Resistance



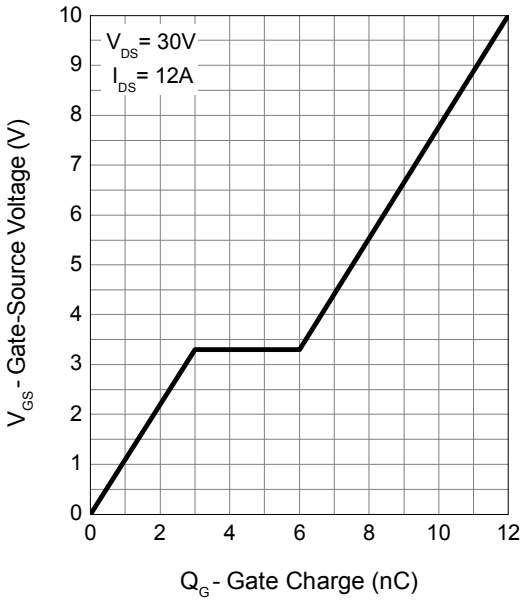
Source-Drain Diode Forward



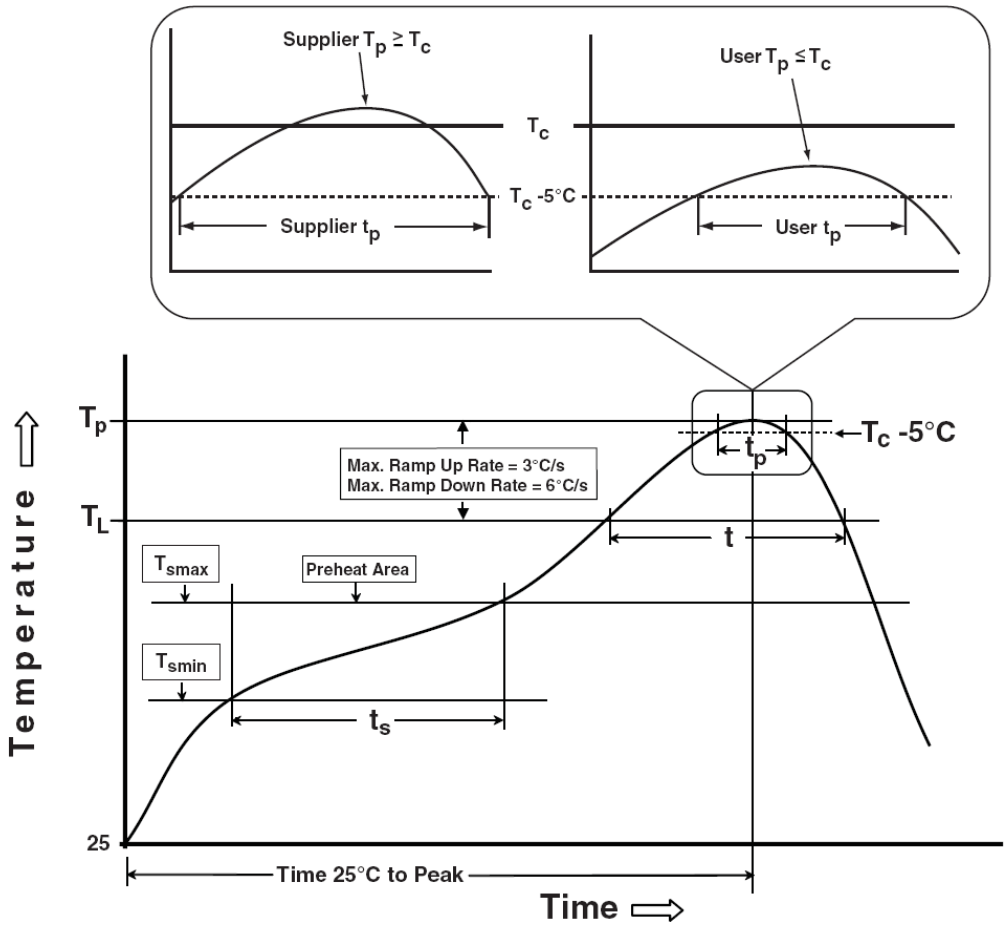
Capacitance



Gate Charge



Classification Profile



Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak Temperature min (T_{smin}) Temperature max (T_{smax}) Time (T_{smin} to T_{smax}) (t_s)	100 °C 150 °C 60-120 seconds	150 °C 200 °C 60-120 seconds
Average ramp-up rate (T_{smax} to T_P)	3 °C/second max.	3°C/second max.
Liquidous temperature (T_L) Time at liquidous (t_L)	183 °C 60-150 seconds	217 °C 60-150 seconds
Peak package body Temperature (T_p)*	See Classification Temp in table 1	See Classification Temp in table 2
Time (t_P)** within 5°C of the specified classification temperature (T_c)	20** seconds	30** seconds
Average ramp-down rate (T_p to T_{smax})	6 °C/second max.	6 °C/second max.
Time 25°C to peak temperature	6 minutes max.	8 minutes max.
* Tolerance for peak profile Temperature (T_p) is defined as a supplier minimum and a user maximum. ** Tolerance for time at peak profile temperature (t_p) is defined as a supplier minimum and a user maximum.		

Table 1. SnPb Eutectic Process – Classification Temperatures (Tc)

Package Thickness	Volume mm^3 <350	Volume mm^3 ^{3}350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

Table 2. Pb-free Process – Classification Temperatures (Tc)

Package Thickness	Volume mm^3 <350	Volume mm^3 350-2000	Volume mm^3 >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 mm – 2.5 mm	260 °C	250 °C	245 °C
≥2.5 mm	250 °C	245 °C	245 °C

Reliability Test Program

Test item	Method	Description
SOLDERABILITY	JESD-22, B102	5 Sec, 245°C
HTRB	JESD-22, A108	1000 Hrs, 80% of VDS max @ Tjmax
HTGB	JESD-22, A108	1000 Hrs, 100% of VGS max @ Tjmax
PCT	JESD-22, A102	168 Hrs, 100%RH, 2atm, 121°C
TCT	JESD-22, A104	500 Cycles, -65°C~150°C

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