

Description:

This P-Channel MOSFET uses advanced trench technology and design to provide excellent $R_{DS(on)}$ with low gate charge.

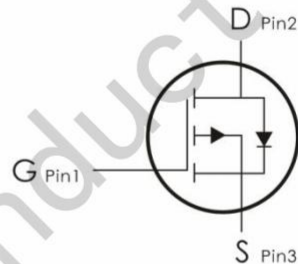
It can be used in a wide variety of applications.



TO-252

Features:

- 1) $V_{DS} = -60V, I_D = -20A, R_{DS(on)} < 68m\Omega @ V_{GS} = -10V$
- 2) Low gate charge.
- 3) Green device available.
- 4) Advanced high cell density trench technology for ultra low $R_{DS(on)}$.
- 5) Excellent package for good heat dissipation.



Absolute Maximum Ratings: ($T_C = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-Source Voltage	-60	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current- $T_C = 25^\circ C^1$	-20	A
	Continuous Drain Current- $T_C = 100^\circ C^1$	-11	A
I_{DM}	Pulsed Drain Current ²	-36	A
E_{AS}	Single Pulse Avalanche Energy ³	35.4	mJ
I_{AS}	Avalanche Current	-26.6	A
P_D	Total Power Dissipation- $T_C = 25^\circ C^4$	34.7	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ C$

Thermal Characteristics:

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Thermal Resistance Junction to Case ¹	3 6	°C/W
$R_{\theta JA}$	Thermal Resistance- Junction to Ambient ¹	62	°C/W

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Sourctce Breakdown Voltage	$V_{GS}=0V, I_D=250\text{ }\mu\text{ A}$	-60	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=-48V, T_J=25\text{ }^{\circ}\text{C}$	---	---	1	$\mu\text{ A}$
		$V_{GS}=0V, V_{DS}=-48V, T_J=55\text{ }^{\circ}\text{C}$	---	---	5	$\mu\text{ A}$
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0A$	---	---	± 100	nA
On Characteristics						
$V_{GS(th)}$	GATE-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\text{ }\mu\text{ A}$	-1.2	---	-2.5	V
$R_{DS(ON)}$	Drain-Source On Resistance ²	$V_{GS}=-10V, I_D=-12A$	---	---	68	m Ω
		$V_{GS}=-4.5V, I_D=-8A$	---	---	105	m Ω
G_{FS}	Forward Transconductance	$V_{DS}=-5V, I_D=-12A$	---	15.4	---	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=-15V, V_{GS}=0V, f=1\text{MHz}$	---	1440	---	pF
C_{oss}	Output Capacitance		---	97	---	
C_{rss}	Reverse Transfer Capacitance		---	65	---	
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=-15V, I_D=-1A,$ $V_{GS}=-10V, R_G=3.3\text{ }\Omega$	---	28.8	---	ns
t_r	Rise Time		---	19.8	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	60.8	---	ns
t_f	Fall Time		---	7.2	---	ns
Q_g	Total Gate Charge	$V_{GS}=-4.5V, V_{DS}=-48V,$	---	9.86	---	nC
Q_{gs}	Gate-Source Charge	$I_D=-10A$	---	3.08	---	nC

Q_{gd}	Gate-Drain "Miller" Charge		---	2.95	---	nC
R_G	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1MHz$	---	13.5	---	Ω
Drain-Source Diode Characteristics						
V_{SD}	Drain Diode Forward Voltage ²	$V_{GS}=0V, I_S=-1A, T_J=25^\circ C$	---	---	-1.2	V
I_S	Continuous Source Current ^{1,5}	$V_G=V_D=0V$, Force Current	---	---	-18	A
I_{SM}	Pulsed Source Current ^{2,5}		---	---	-36	A

Notes:

1. The data tested by surface mounted on a 1 inch FR-4 board with 20Z copper.
2. The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
3. The EAS data shows Max. rating. The test condition is $V_{DD}=-25V, V_{GS}=-10V, L=0.1mH, I_{AS}=-26.6A$
4. The power dissipation is limited by $150^\circ C$ junction temperature
5. The data is theoretically the same as I_D and I_{DM} , in real applications, should be limited by total power dissipation.

Typical Characteristics: ($T_C=25^\circ C$ unless otherwise noted)

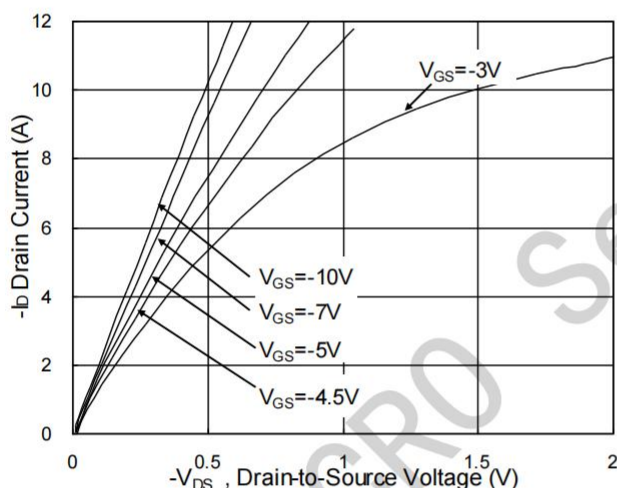


Fig.1 Typical Output Characteristics

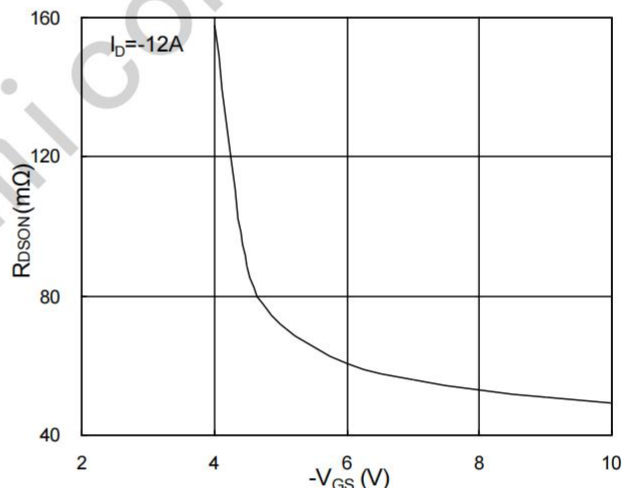


Fig.2 On-Resistance v.s Gate-Source

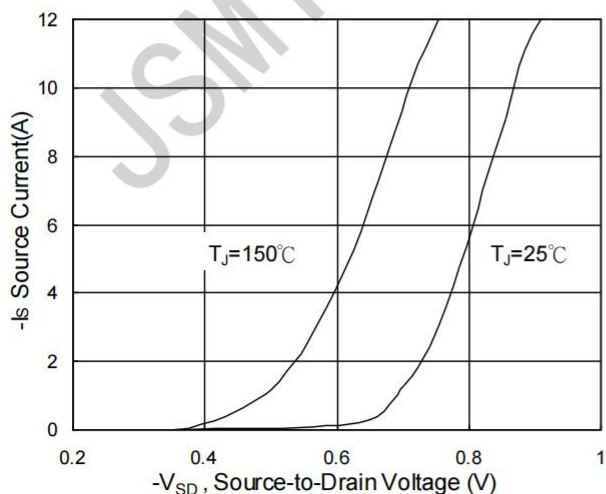


Fig.3 Forward Characteristics of Reverse

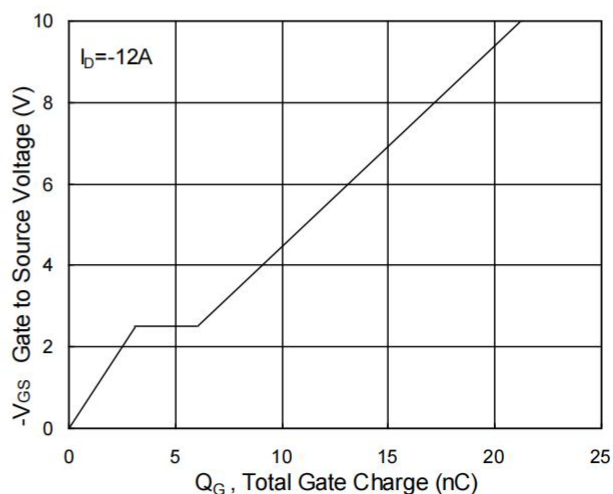


Fig.4 Gate-Charge Characteristics

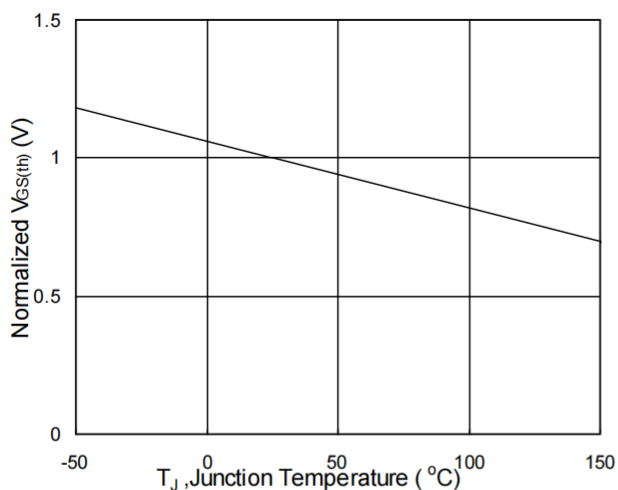


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

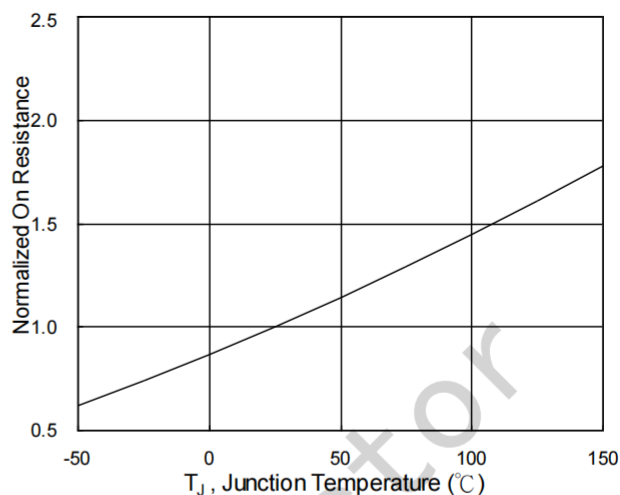


Fig.6 Normalized $R_{DS(on)}$ v.s T_J

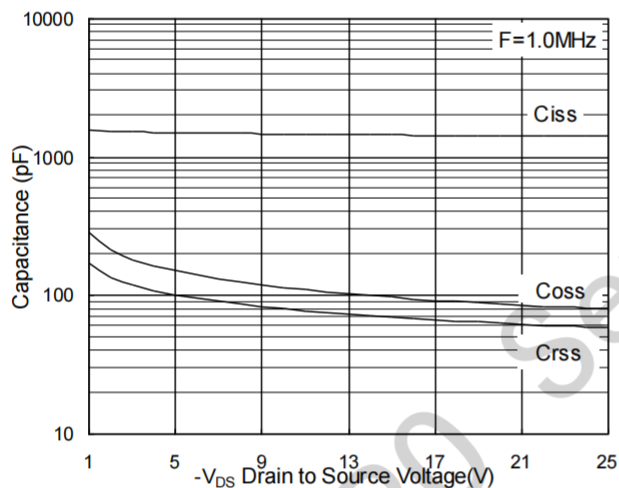


Fig.7 Capacitance

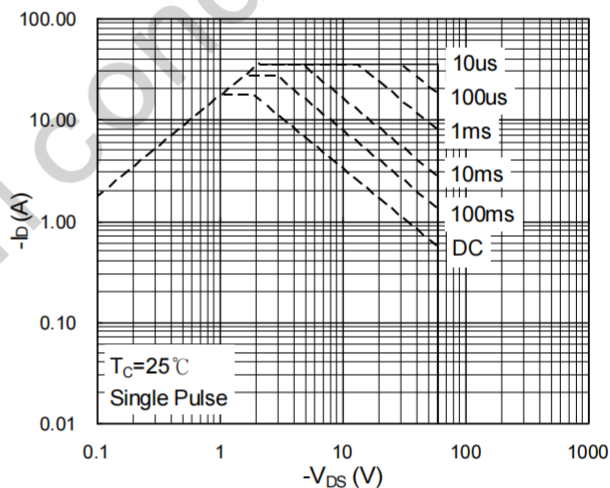


Fig.8 Safe Operating Area

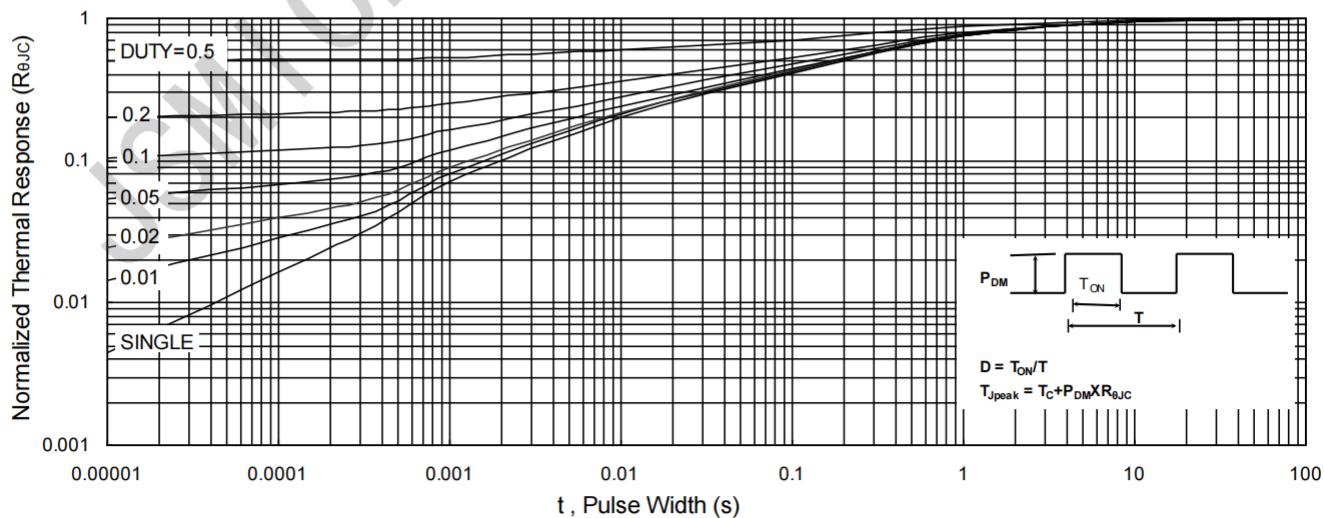


Fig.9 Normalized Maximum Transient Thermal Impedance

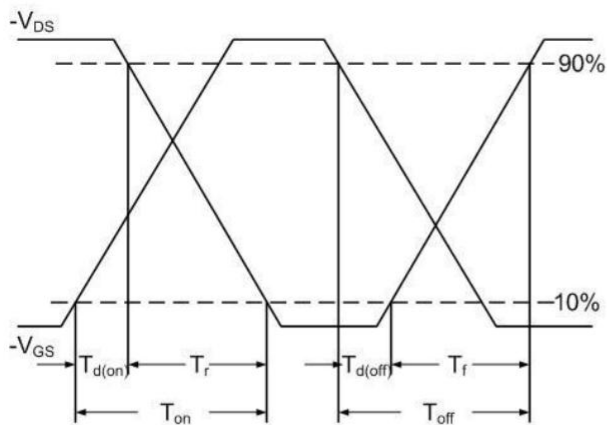


Fig.10 Switching Time Waveform

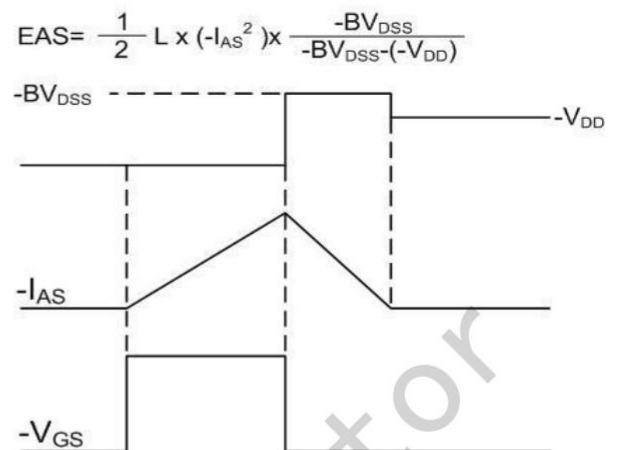
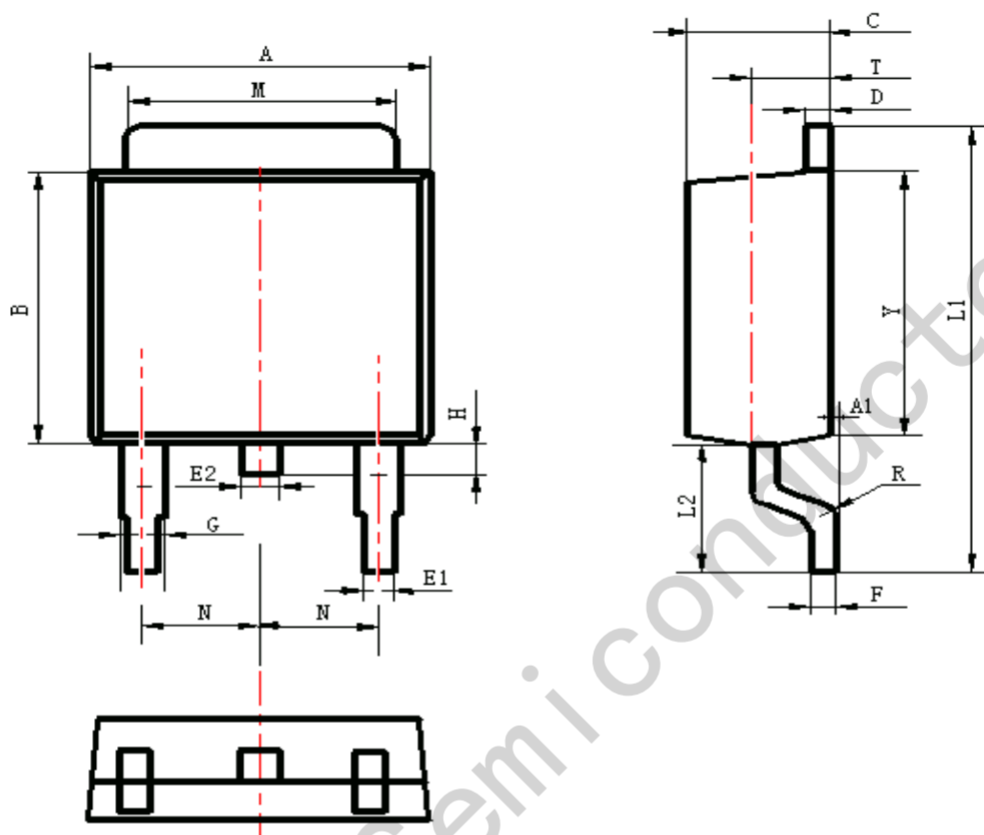


Fig.11 Unclamped Inductive Waveform

Package Information

TO-252



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	6.30	6.90	0.248	0.272
A1	0.00	0.16	0.000	0.006
B	5.70	6.30	0.224	0.248
C	2.10	2.50	0.083	0.098
D	0.30	0.70	0.012	0.028
E1	0.60	0.90	0.024	0.035
E2	0.70	1.00	0.028	0.039
F	0.30	0.60	0.012	0.024
G	0.70	1.20	0.028	0.047
L1	9.60	10.50	0.378	0.413
L2	2.70	3.10	0.106	0.122
H	0.40	1.00	0.016	0.039
M	5.10	5.50	0.201	0.217
N	2.09	2.49	0.082	0.098
R	0.30		0.012	
T	1.40	1.60	0.055	0.063
Y	5.10	6.30	0.201	0.248