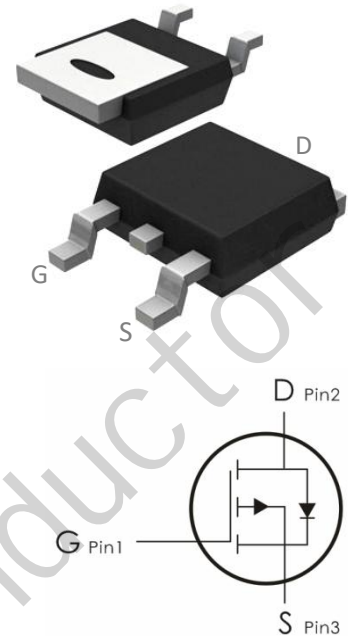


## Description:

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.



## 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	$\pm 20$	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 <sup>2</sup>	-36	A
$E_{AS}$	Single Pulse Avalanche Energy <sup>3</sup>	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 <sup>1</sup>	3.6	°C/W
$R_{\theta JA}$	Thermal Resistance- Junction to Ambient <sup>1</sup>	62	°C/W

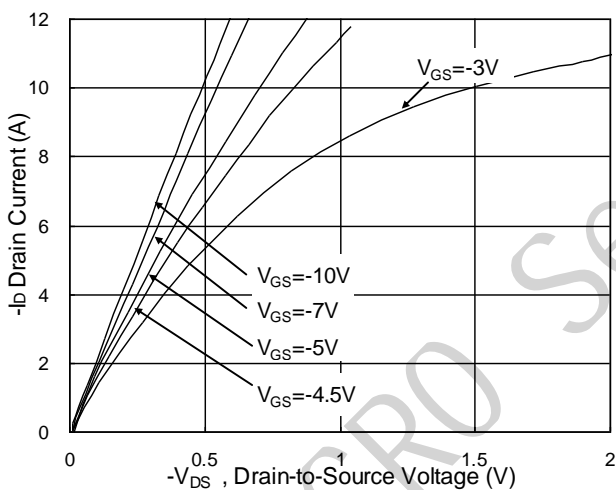
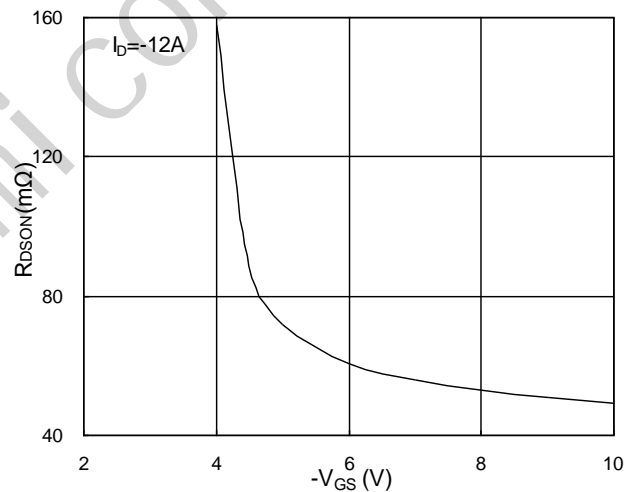
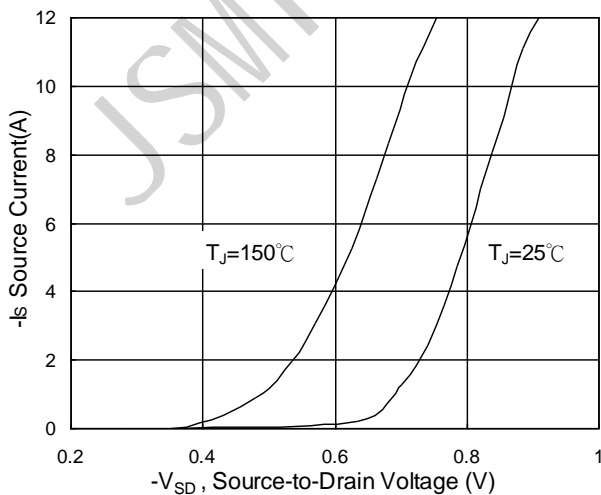
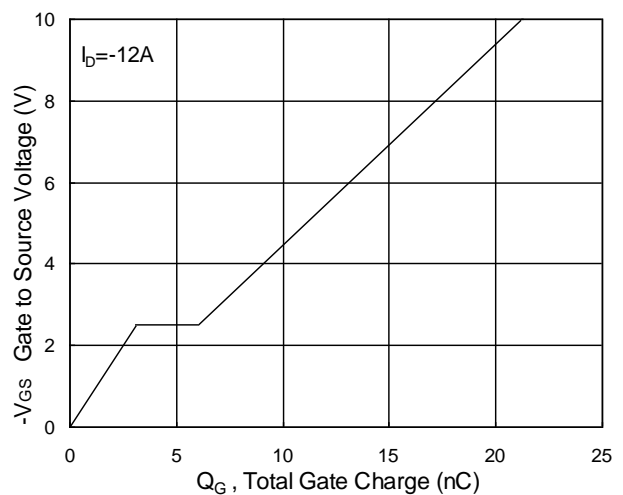
**Electrical Characteristics:** ( $T_C=25^\circ\text{C}$  unless otherwise noted)

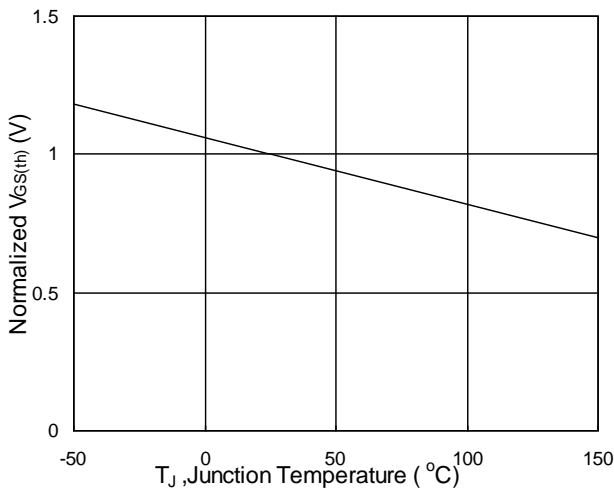
Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\ \mu A$	-60	---	---	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=-48V, T_J=25^\circ\text{C}$	---	---	1	$\mu A$
		$V_{GS}=0V, V_{DS}=-48V, T_J=55^\circ\text{C}$	---	---	5	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0A$	---	---	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	GATE-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\ \mu A$	-1.2	---	-2.5	V
$R_{DS(on)}$	Drain-Source On Resistance <sup>2</sup>	$V_{GS}=-10V, I_D=-12A$	---	---	68	m $\Omega$
		$V_{GS}=-4.5V, I_D=-8A$	---	---	105	m $\Omega$
$G_{FS}$	Forward Transconductance	$V_{DS}=-5V, I_D=-12A$	---	15.4	---	S
<b>Dynamic Characteristics</b>						
$C_{iss}$	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	---	
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=-15V, I_D=-1A,$ $V_{GS}=-10V, R_G=3.3\ \Omega$	---	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	---
$Q_{gs}$	Gate-Source Charge	$I_D=-10A$	---	3.08	---	nC

<b>Q<sub>gd</sub></b>	Gate-Drain "Miller" Charge		---	2.95	---	nC
<b>R<sub>G</sub></b>	Gate Resistance	V <sub>DS</sub> =0V , V <sub>GS</sub> =0V , f=1MHz	---	13.5	---	Ω
<b>Drain-Source Diode Characteristics</b>						
<b>V<sub>SD</sub></b>	Drain Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =-1A, T <sub>J</sub> =25°C	---	---	-1.2	V
<b>I<sub>S</sub></b>	Continuous Source Current <sup>1,5</sup>	V <sub>G</sub> =V <sub>D</sub> =0V , Force Current	---	---	-18	A
<b>I<sub>SM</sub></b>	Pulsed Source Current <sup>2,5</sup>		---	---	-36	A

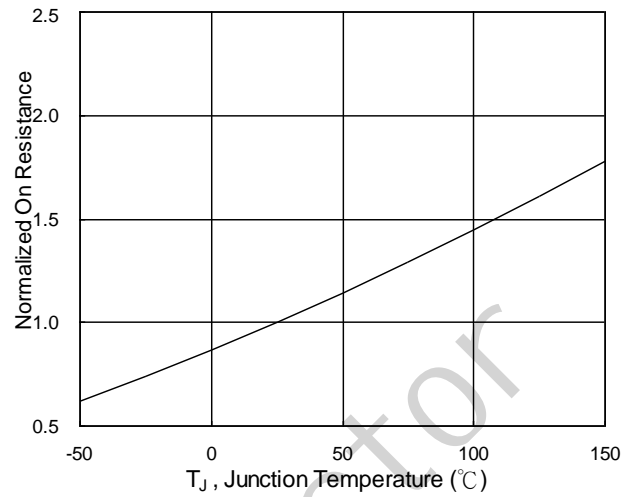
**Notes:**

1. The data tested by surface mounted on a 1 inch FR-4 board with 2OZ 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<sub>DD</sub>=-25V, V<sub>GS</sub>=-10V, L=0.1mH, I<sub>AS</sub>=-26.6A
4. The power dissipation is limited by 150°C junction temperature
5. The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.

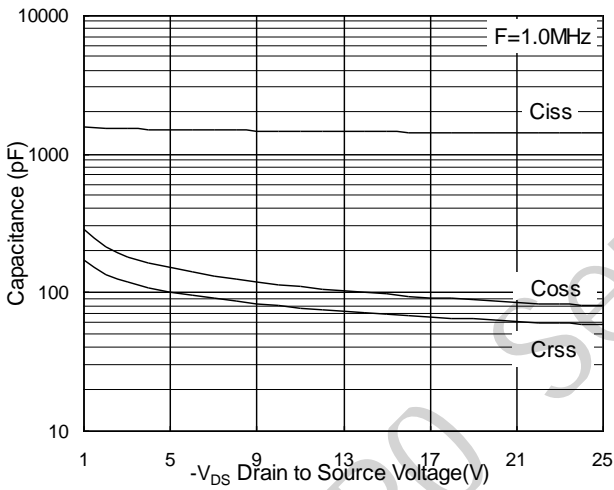
**Typical Characteristics:** (T<sub>c</sub>=25°C unless otherwise noted)

**Fig.1 Typical Output Characteristics**

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

**Fig.3 Forward Characteristics of Reverse**

**Fig.4 Gate-Charge Characteristics**



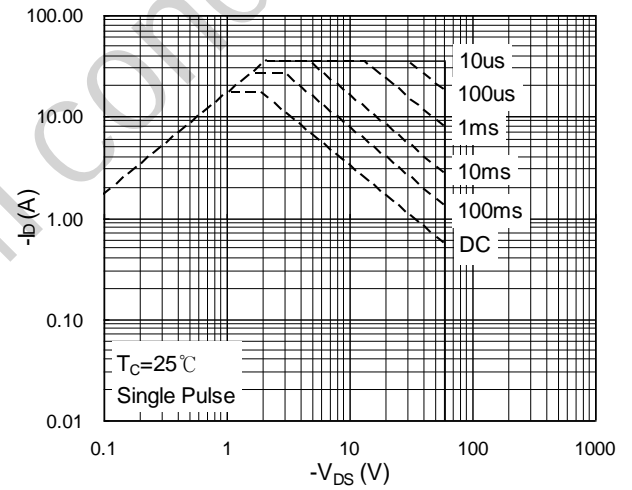
**Fig.5 Normalized  $V_{GS(th)}$  v.s  $T_J$**



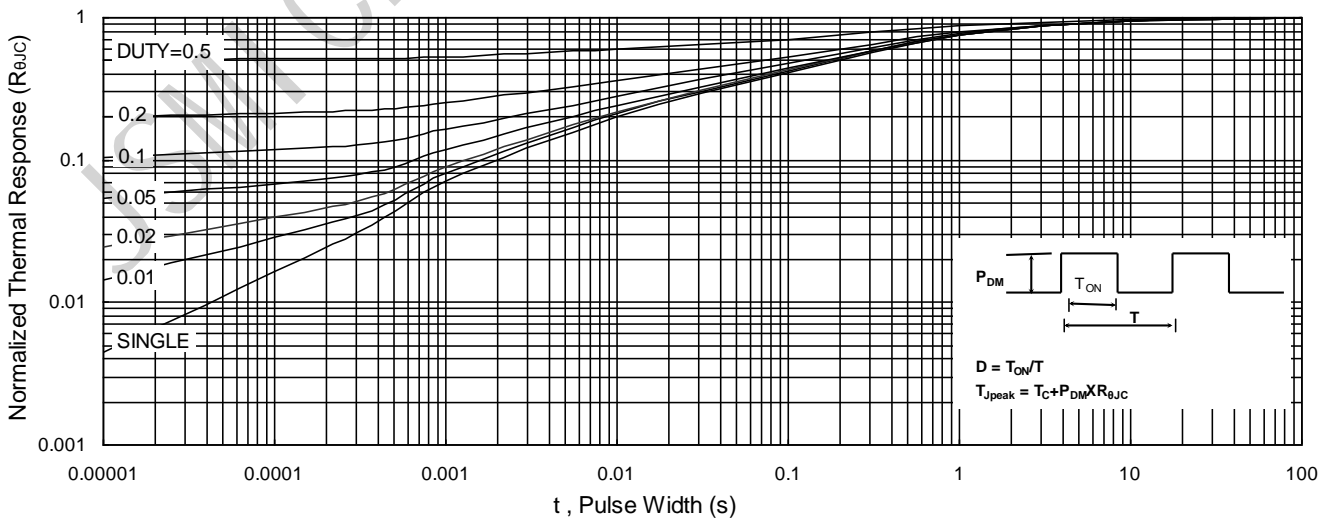
**Fig.6 Normalized  $R_{DS(on)}$  v.s  $T_J$**



**Fig.7 Capacitance**



**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**

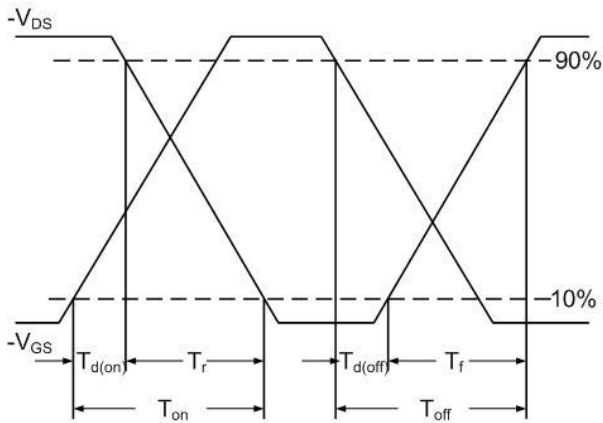


Fig.10 Switching Time Waveform

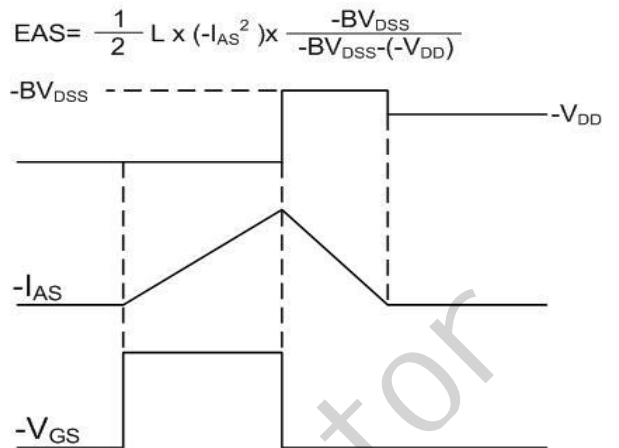
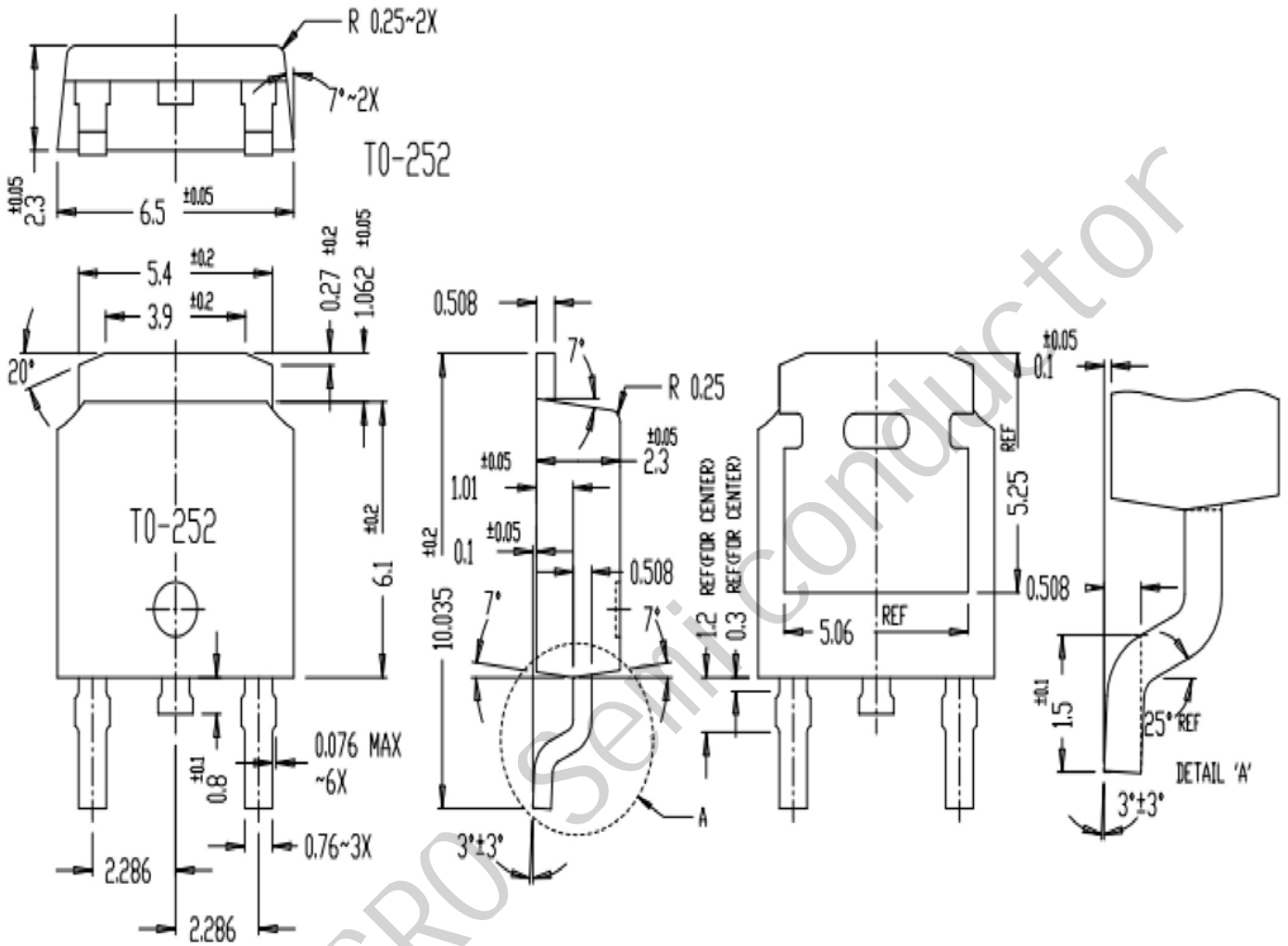


Fig.11 Unclamped Inductive Waveform

外形尺寸图 / Package Dimensions



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