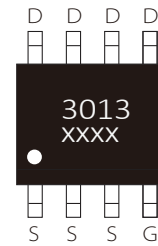


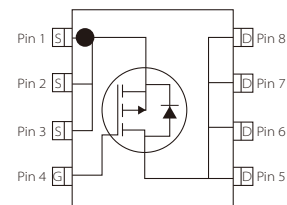
## FEATURES

- | Low  $R_{DS(on)}$  Provides Higher Efficiency and Extends Battery Life
- | Excellent ON resistance for higher DC current :  
 $R_{DS(ON)} < 13m\ \Omega @ V_{GS} = -10V$  (Type:12.5m $\Omega$ )
- |  $V_{DS} = -30V, I_D = -30A$
- | Supper high density cell design
- | High performance trench technology
- | High Power and current handing capability
- | Surface Mount Package


**SOP-8**

**Marking**

## APPLICATION

- | Load/Power Switching for portable device
- | Charging device
- | Power supply converters circuit


**Schematic Symbol**

## APPROVALS

<b>RoHS</b>	Compliance with 2011/65/EU
<b>HF</b>	Compliance with IEC61249-2-21:2003

## ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	-30	V
Maximum Drain Current - Continuous (Ta=25°C)	$I_D$	-30	A
Maximum Drain Current - Continuous (Ta=70°C)	$I_D$	-21.7	A
Pulsed Drain Current	$I_{DM}$	-96	A
Gate-Source Voltage	$V_{GS}$	±20	V
Maximum Power Dissipation	$P_D$	2.5	W
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	°C

## ELECTRICAL CHARACTERISTICS (Ta=25°C )

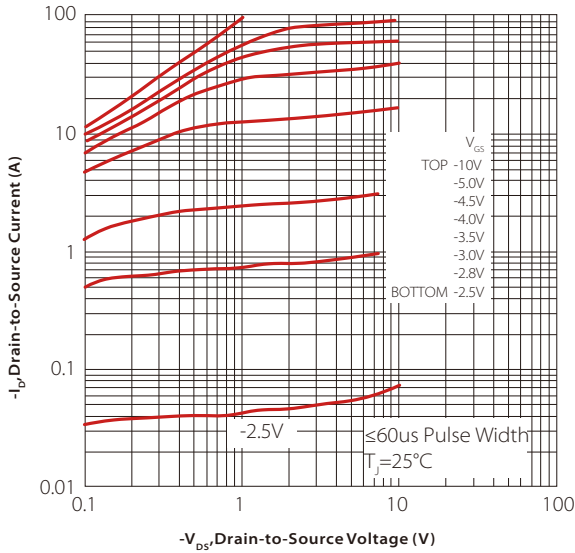
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-30			V
Gate-body leakage current	$I_{GSS}$	$V_{DS}=\pm 20V, V_{GS}=0V$			$\pm 0.1$	$\mu A$
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=-30V, V_{GS}=0V$			-1	$\mu A$
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.0	-1.5	-2.2	$\mu A$
Forward Trans conductance	$g_{FS}$	$V_{DS}=-10V, I_D=-2.8\mu A$		20		S
Drain-source on-state resistance <sup>(2)</sup>	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-8A$		10.6	13	m $\Omega$
		$V_{GS}=-4.5V, I_D=-4A$		15.6	21	m $\Omega$
<b>Dynamic characteristics</b>						
Input capacitance	$C_{iss}$	$V_{DS}=-25V, V_{GS}=0V, f=1MHz$		1680		pF
Output capacitance	$C_{oss}$			220		pF
Reverse transfer capacitance	$C_{rss}$			350		pF
Turn-on delay time	$t_{d(on)}$	$V_{DD}=-15V, I_D=-1.0A$ $V_{GS}=-4.5V, R_G=6.8\Omega$		19		ns
Turn-on Rise Time	$t_r$			57		ns
Turn-Off Delay Time	$t_{d(off)}$			80		ns
Turn-off Fall yime	$t_f$			66		ns
Total Gate Charge	$Q_g$	$V_{DS}=-15V, I_D=-9.6A$ $V_{GS}=-10V$		35	52	nC
Gate-Source Charge	$Q_{gs}$			5.3		nC
Gate-Drain Charge	$Q_{gd}$			8.5		nC
<b>Drain Source Body Diode Characteristics</b>						
Diode Forward voltage <sup>(2)</sup>	$V_{DS}$	$V_{GS}=0V, I_S=-2.5A$			-1.2	V

Notes:

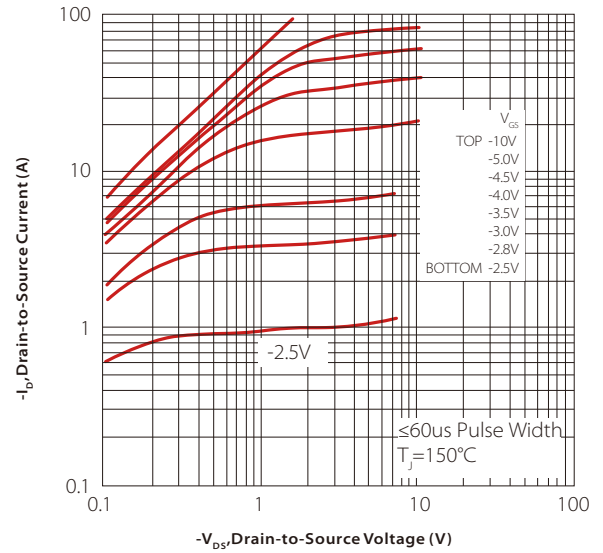
1. Repetitive Rating: pulse width limited by maximum junction temperature
2. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycles  $\leq 2\%$ .

# PARAMETER CHARACTERISTIC CURVE

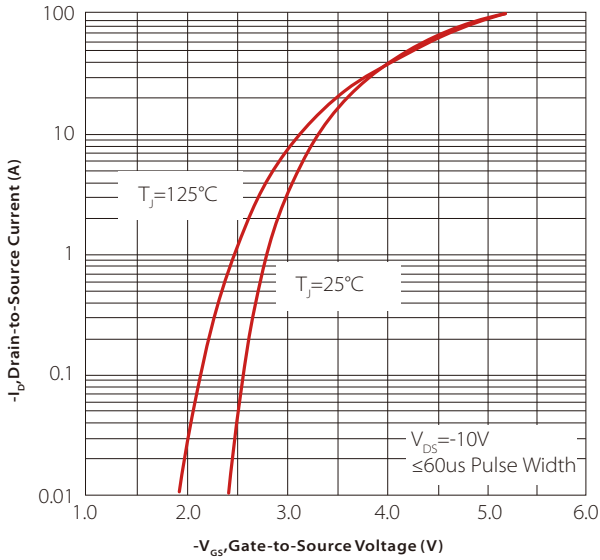
**Figure1: Typical Output Characteristics**



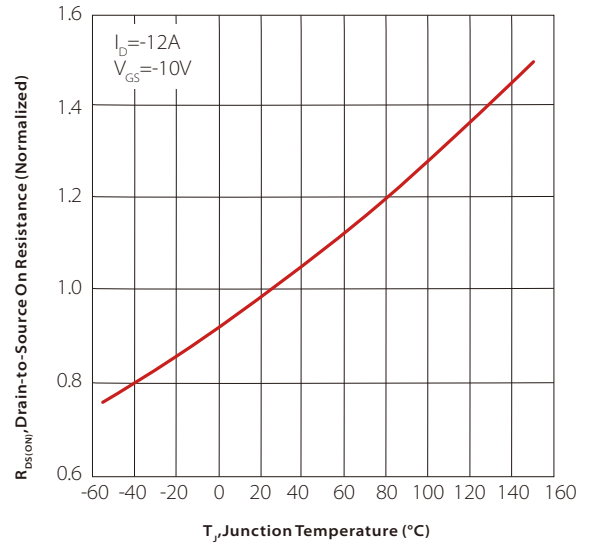
**Figure2: Typical Output Characteristics**



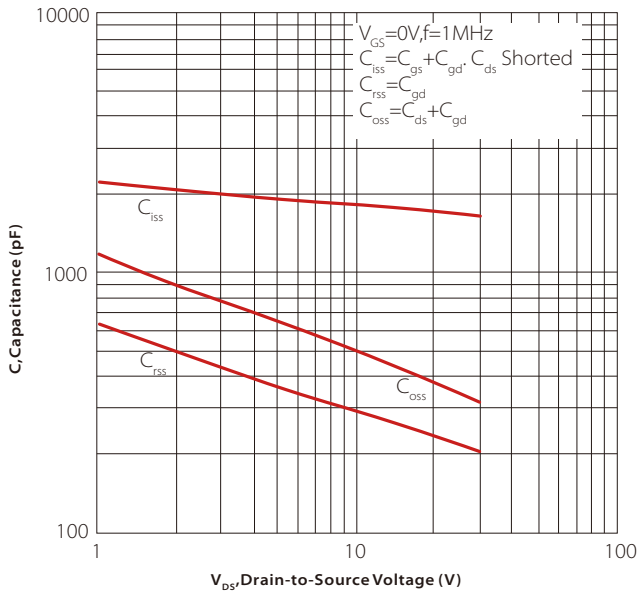
**Figure3: Typical Transfer Characteristics**



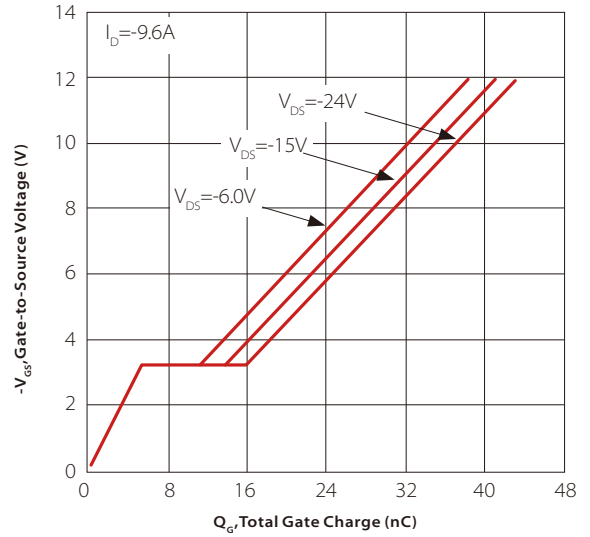
**Figure 4: Normalized On-Resistance Vs. Temperature**



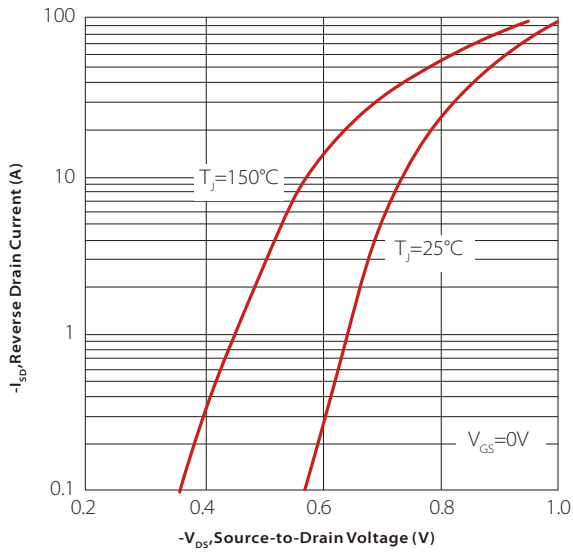
**Figure 5: Typical Capacitance Vs. Drain-to-Source Voltage**



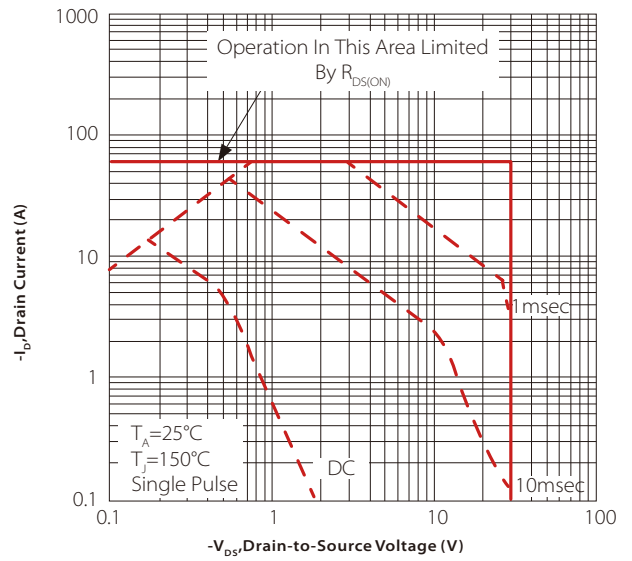
**Figure 6: Typical Gate Charge Vs. Gate-to-Source Voltage**



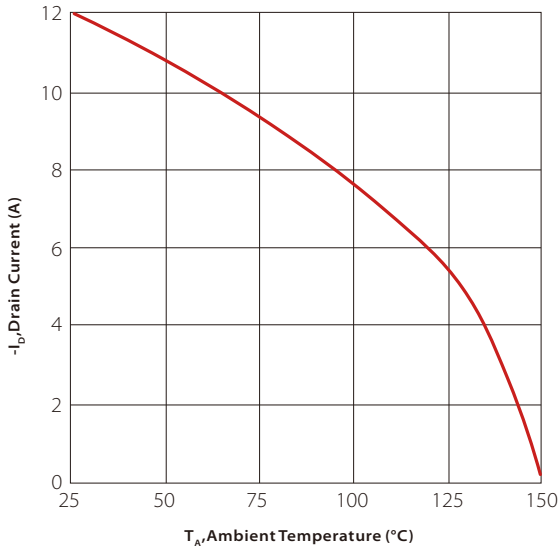
**Figure 7: Typical Source-Drain Dide Forward Voltage**



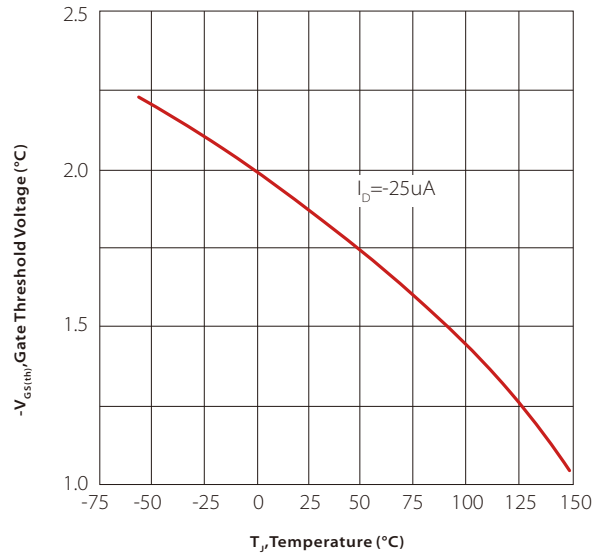
**Figure 8: Maximum Safe Operation Area**



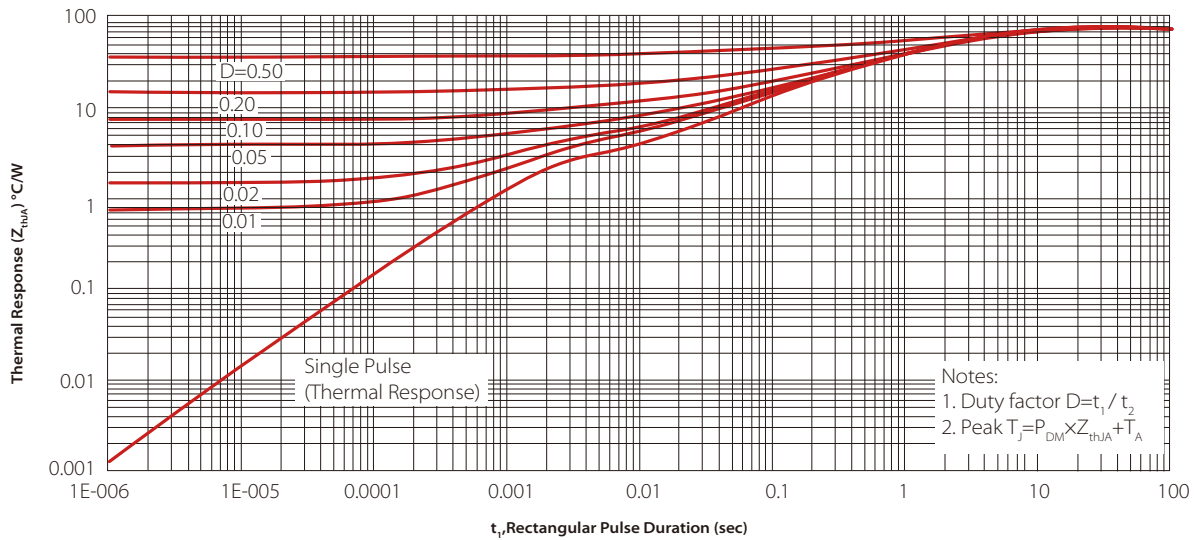
**Figure 9: Maximum Drain Current vs. Ambient Temperature**



**Figure 10: Threshold Voltage vs. Temperature**

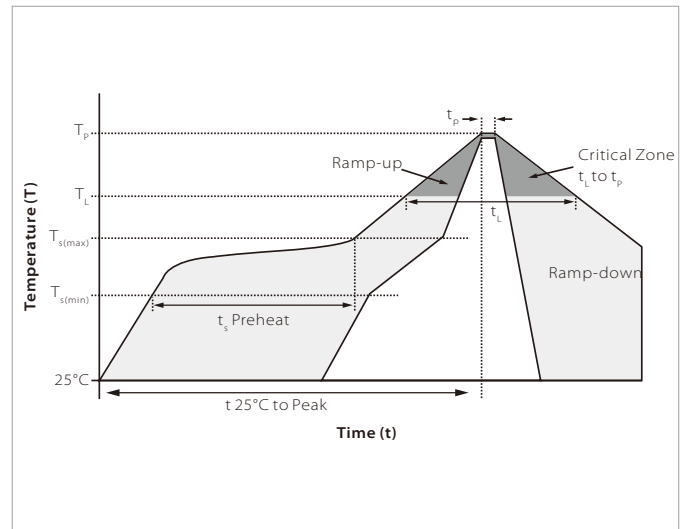


**Figure 11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient**

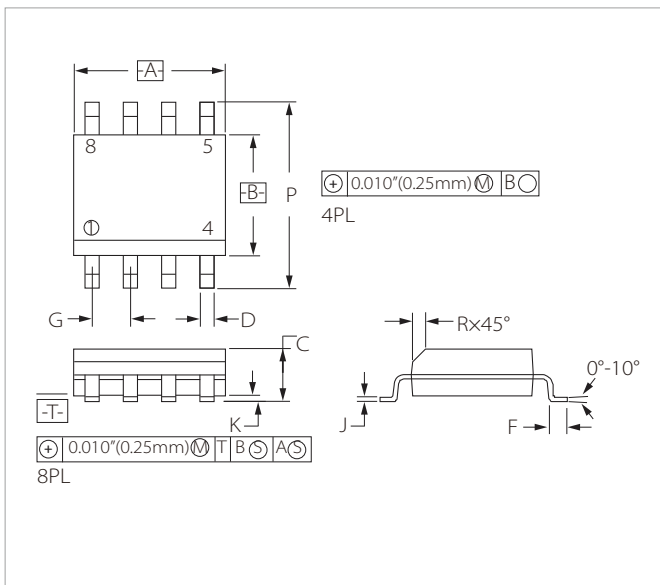


## SOLDERING PARAMETERS

Reflow Condition		Lead-free assembly
Pre Heat	Temperature Max ( $T_{s(min)}$ )	150°C
	Temperature Max ( $T_{s(max)}$ )	200°C
	Time (min to max) ( $t_s$ )	60 – 180 secs
Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak)		3°C/second max
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/second max
Reflow	Temperature ( $T_L$ ) (Liquidus)	217°C
	Time (min to max) ( $t_l$ )	60 – 150 seconds
Peak Temperature ( $T_p$ )		260°C
Time within 5°C of actual peak Temperature ( $t_p$ )		20 – 40 seconds
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature ( $T_p$ )		8 minutes max.
Do not exceed		260°C

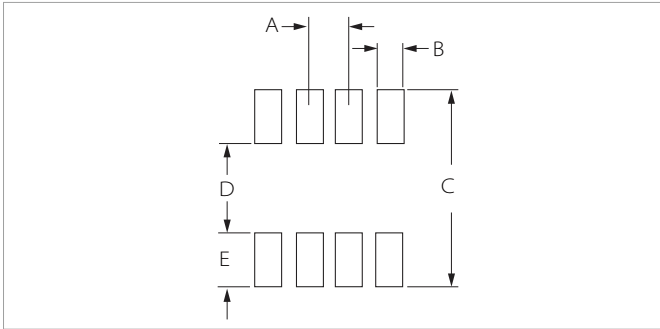


## SOP-8 PACKAGE INFORMATION



Ref.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.80	5.00	0.189	0.196
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27BSC		0.050BSC	
J	0.18	0.25	0.007	0.009
K	0.10	0.25	0.004	0.008
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

## RECOMMENDED PAD LAYOUT DIMENSIONS



Ref.	Millimeters		Inches	
	Min	Max	Min	Max
A	1.14	1.40	0.045	0.055
B	0.64	0.89	0.025	0.035
C	6.22	-	0.245	-
D	3.94	4.17	0.155	0.165
E	1.02	1.27	0.040	0.050

## ORDERING INFORMATION

Part Number	Component Package	QTY/Reel	Reel Size
SPM3013PE	SOP-8	3000PCS	7"

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