

### Description

These P-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode

These devices are well suited for high efficiency fast switching applications.

### Features

- ◆ -20V/-4.1A,  $R_{DS(ON)} = 65m\Omega @ V_{GS} = -4.5V$
- ◆ Improved dv/dt capability
- ◆ Suit for -1.8V Gate Drive Applications
- ◆ Fast switching
- ◆ SOT-23 package design

### Applications

- ◆ Notebook
- ◆ Battery Protection
- ◆ Load Switch
- ◆ Hand-held Instruments

### Pin Configuration



### Absolute Maximum Ratings (T<sub>C</sub>=25°C Unless Otherwise Noted)

Parameter	Symbol	Maximum	Unit
Drain-Source Voltage	V <sub>DS</sub>	-20	V
Gate- Source Voltage	V <sub>GS</sub>	± 10	V
Continuous Drain Current	I <sub>D</sub>	T <sub>C</sub> = 25 °C	-4.1
		T <sub>C</sub> = 100 °C	-2.6
Pulsed Drain Current	I <sub>DM</sub>	-16.4	A
Power Dissipation	P <sub>D</sub>	T <sub>C</sub> = 25 °C	1.56
		Derate above 25 °C	0.012
Operating junction temperature range	T <sub>J</sub>	- 55 to 150	°C
Storage temperature range	T <sub>STG</sub>	- 55 to 150	°C

### Thermal Resistance Ratings

Parameter	Symbol	Maximum	Unit
Junction-to-Ambient	R <sub>θJA</sub>	80	°C/W



Ordering Information

Device	Package	Remark
ECDN2313S	SOT-23	3000 pcs / Reel

Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static Parameters</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA	-20	-	-	V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = -250μA	-0.4	-0.6	-0.8	V
Gate Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±10 V	-	-	±100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V T <sub>J</sub> = 25 °C	-	-	-1	μA
		V <sub>DS</sub> = -16V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125 °C	-	-	-10	
Forward Trans conductance <sup>A</sup>	g <sub>fs</sub>	V <sub>DS</sub> = -10V, I <sub>D</sub> = -3A	-	5.5	-	S
Drain-Source On-State Resistance <sup>A</sup>	R <sub>DS(ON)</sub>	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -3A	-	52	65	mΩ
		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -2A	-	73	85	
		V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -1.5A	-	105	130	
<b>Dynamic Parameters</b>						
Input Cap.	C <sub>iss</sub>	V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V, F = 1MHz	-	515	745	pF
Output Cap.	C <sub>oss</sub>		-	55	80	
Reverse Transfer Cap.	C <sub>riss</sub>		-	20	30	
Total Gate Charge <sup>B</sup>	Q <sub>g</sub>	V <sub>DS</sub> = -10V, V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -3A	-	6.4	9	nC
Gate-Source Charge <sup>B</sup>	Q <sub>gs</sub>		-	0.9	1	
Gate-Drain Charge <sup>B</sup>	Q <sub>gd</sub>		-	1.6	3	
Turn-On Time <sup>B</sup>	t <sub>d(ON)</sub>	V <sub>DD</sub> = -10V, I <sub>D</sub> = -1A, V <sub>GS</sub> = -4.5V, R <sub>G</sub> = 25Ω	-	5	9	nS
	t <sub>r</sub>		-	17.4	33	
Turn-Off Time <sup>B</sup>	T <sub>d(OFF)</sub>		-	40.7	80	
	T <sub>f</sub>		-	11.4	23	
<b>Source-Drain Diode Ratings And Characteristics</b>						
Continuous Current	I <sub>S</sub>	V <sub>G</sub> = V <sub>D</sub> = 0V, Force Current	-	-	-4.1	A
Pulsed Current <sup>C</sup>	I <sub>SM</sub>		-	-	-16.4	A
Diode Forward Voltage <sup>A</sup>	V <sub>SD</sub>	I <sub>S</sub> = -1A, V <sub>GS</sub> = 0V	-	-	-1	V

Note

A: Pulse test: Pulse width ≤ 300μsec, Duty Cycle ≤ 2%

B: Independent of operating temperature

C: Pulse width limited by maximum junction temperature.

Typical Characteristics

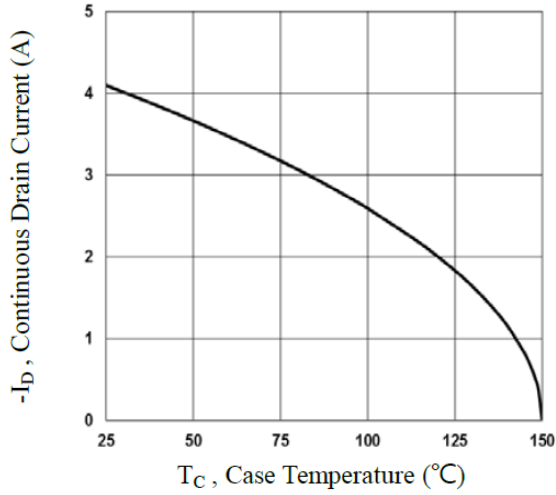


Fig.1 Continuous Drain Current vs.  $T_c$

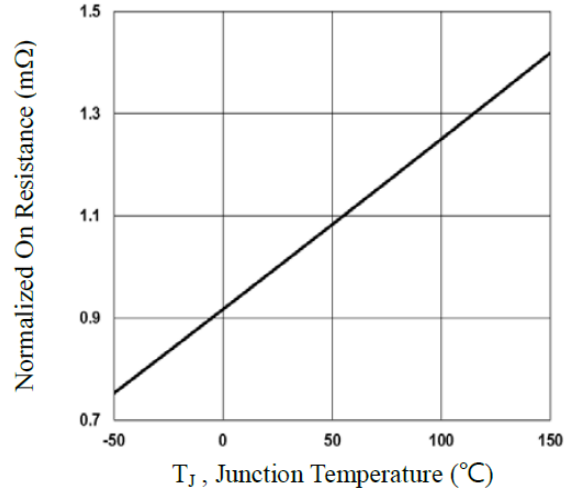


Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_j$

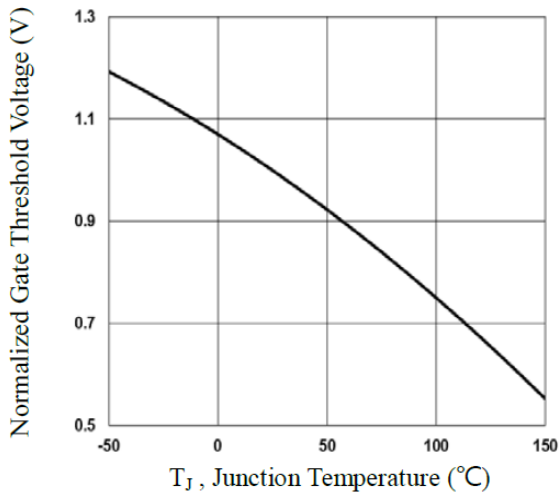


Fig.3 Normalized  $V_{th}$  vs.  $T_j$

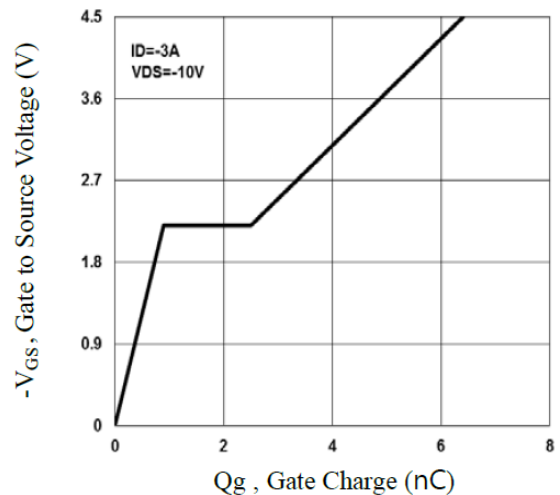


Fig.4 Gate Charge Waveform

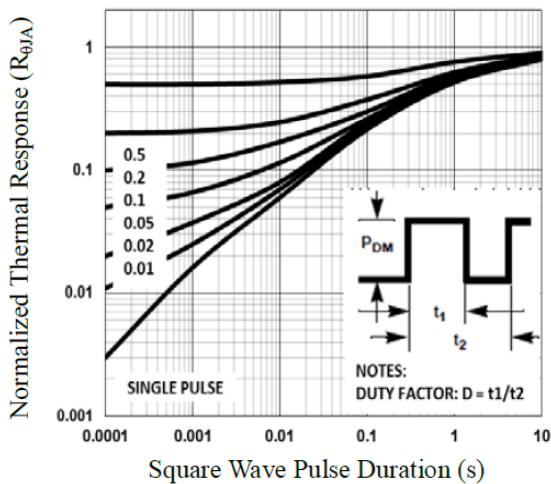


Fig.5 Normalized Transient Impedance

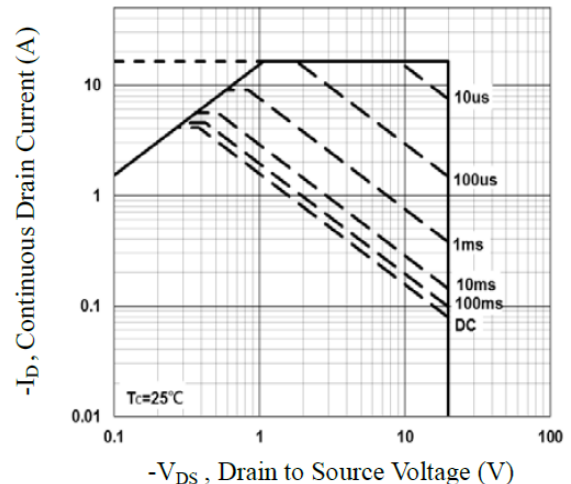
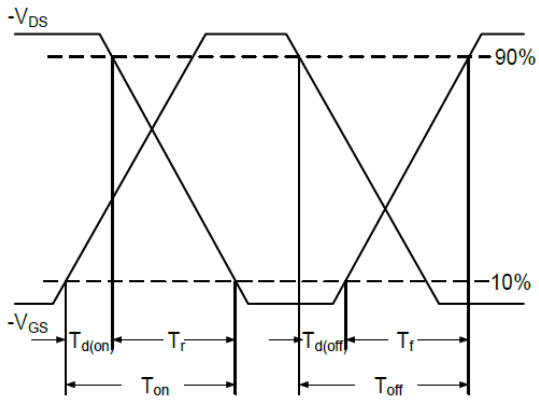
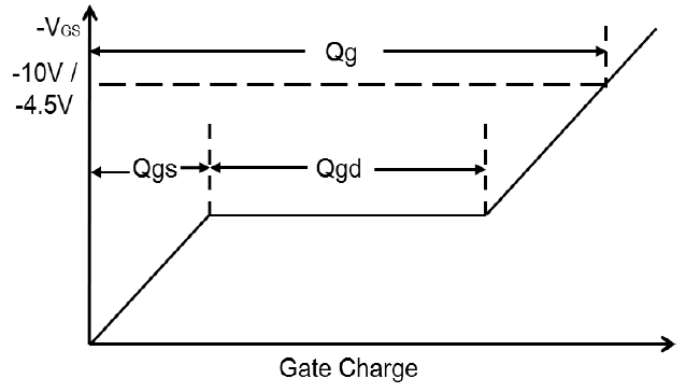


Fig.6 Maximum Safe Operation Area

### Typical Characteristics



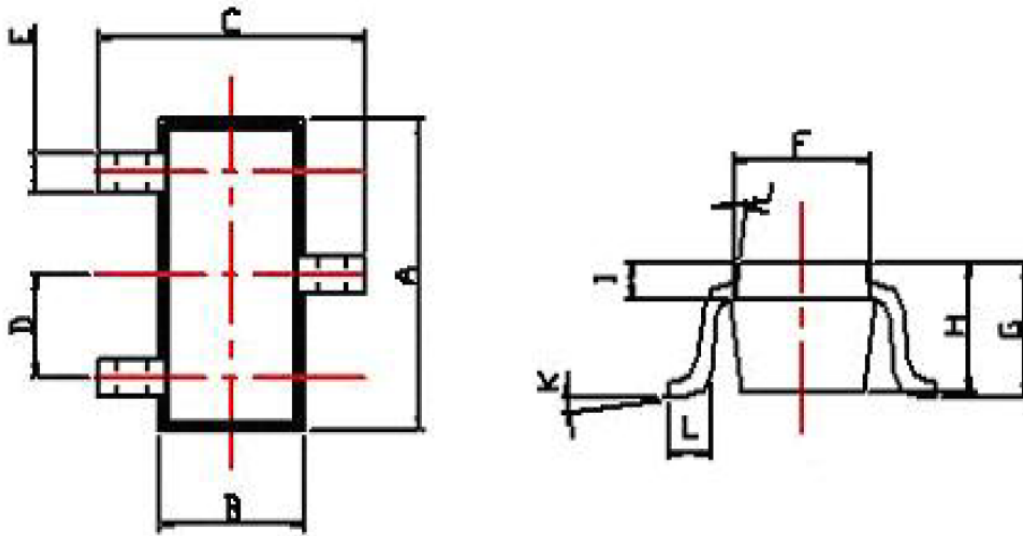
**Fig.7 Switching Time Waveform**



**Fig.8 Gate Charge Waveform**

### Physical Dimensions

3-Pin surface Mount SOT-23-3



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	2.70	3.10	G	0.9	1.4
B	1.20	1.66	H	0.8	1.30
C	2.37	2.90	I	0.25	0.7
D	0.85	1.15	J	7 ± 2°.	
E	0.350 + 0.15/-0.05		K	0 ~ 10°.	
F	1.07	1.53	L	0.2 (MIN)	