

**Features**

- High Density Cell Design For Ultra Low  $R_{DS(on)}$
- High Speed Switching
- ESD Protected Up to 2.5KV (HBM)
- Trench Power LV MOSFET Technology
- Epoxy Meets UL 94 V-0 Flammability Rating
- Moisture Sensitivity Level 1
- Halogen Free Available Upon Request By Adding Suffix "-HF"
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

**Maximum Ratings**

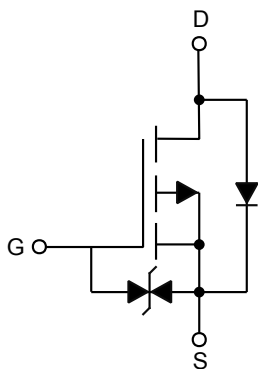
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 96°C/W Junction to Ambient<sup>(Note1)</sup>

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	±12	V
Drain Current $T_A=25^\circ\text{C}$ Steady State	$I_D$	-5.6	A
		$T_A=70^\circ\text{C}$ Steady State	
Pulsed Drain Current <sup>(Note2)</sup>	$I_{DM}$	-23	A
Total Power Dissipation	$P_D$	1.3	W

Note 1. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch.

2. Pulse Test: Pulse Width ≤ 300us, Duty cycle ≤ 2%.

**Internal Structure:**

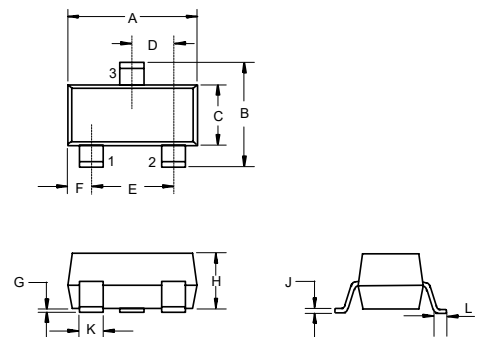


1. GATE
2. SOURCE
3. DRAIN

Marking: 3415.

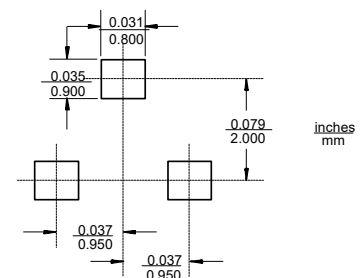
**P-Channel  
Enhancement Mode  
Field Effect Transistor**

**SOT-23**



DIM	DIMENSIONS				NOTE
	INCHES		MM		
	MIN	MAX	MIN	MAX	
A	0.110	0.120	2.80	3.04	
B	0.083	0.104	2.10	2.64	
C	0.047	0.055	1.20	1.40	
D	0.034	0.041	0.85	1.05	
E	0.067	0.083	1.70	2.10	
F	0.018	0.024	0.45	0.60	
G	0.0004	0.006	0.01	0.15	
H	0.035	0.043	0.90	1.10	
J	0.003	0.007	0.08	0.18	
K	0.012	0.020	0.30	0.51	
L	0.007	0.020	0.20	0.50	

**Suggested Solder Pad Layout**



**Electrical Characteristics @ 25°C (Unless Otherwise Specified)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	-20			V
Gate-Source Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 10V$		$\pm 2.5$	$\pm 10$	$\mu A$
		$V_{DS}=0V, V_{GS}=\pm 8V$		$\pm 0.9$	$\pm 2$	$\mu A$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-20V, V_{GS}=0V$			-1	$\mu A$
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.40	-0.62	-1.0	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=-4.5V, I_D=-5.6A$		29	42	m $\Omega$
		$V_{GS}=-2.5V, I_D=-4.3A$		36	55	
		$V_{GS}=-1.8V, I_D=-2A$		55	100	
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=-5.6A$		-0.8	-1.2	V
Maximum Body-Diode Continuous Current	$I_S$				-5.6	A
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=-10V, V_{GS}=0V, f=1MHz$		940		pF
Output Capacitance	$C_{oss}$			219		
Reverse Transfer Capacitance	$C_{rss}$			116		
<b>Switching Characteristics</b>						
Total Gate Charge	$Q_g$	$V_{DS}=-10V, V_{GS}=-4.5V, I_D=-4A$		7.2		nC
Gate-Source Charge	$Q_{gs}$			1.2		
Gate-Drain Charge	$Q_{gd}$			1.6		
Turn-On Delay Time	$t_{d(on)}$	$V_{GS}=-4.5V, V_{DS}=-10V, R_L=2.5\Omega, R_{GEN}=3\Omega$		15		ns
Turn-On Rise Time	$t_r$			63		
Turn-Off Delay Time	$t_{d(off)}$			21		
Turn-Off Fall Time	$t_f$			12		

**Curve Characteristics**

Fig. 1 - Typical Output Characteristics

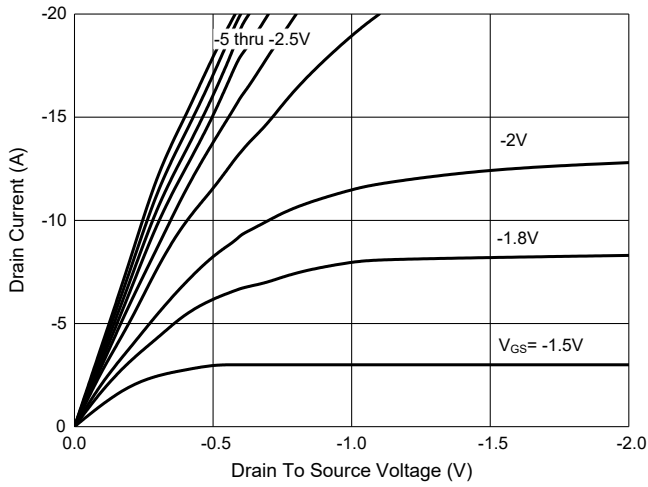


Fig. 2 - Transfer Characteristics

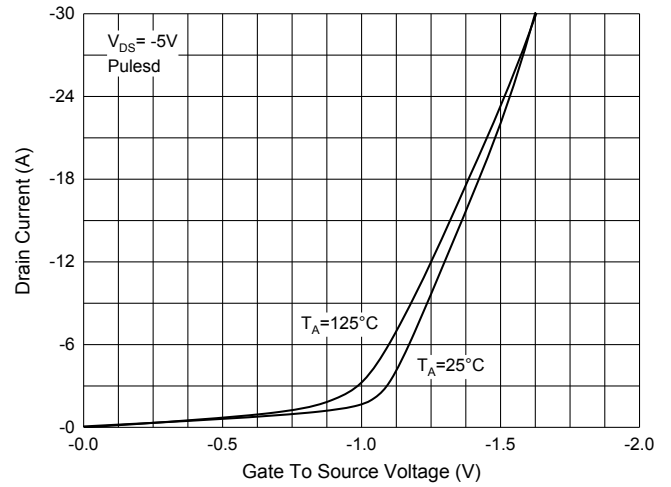


Fig. 3 -  $R_{DS(ON)} - I_D$

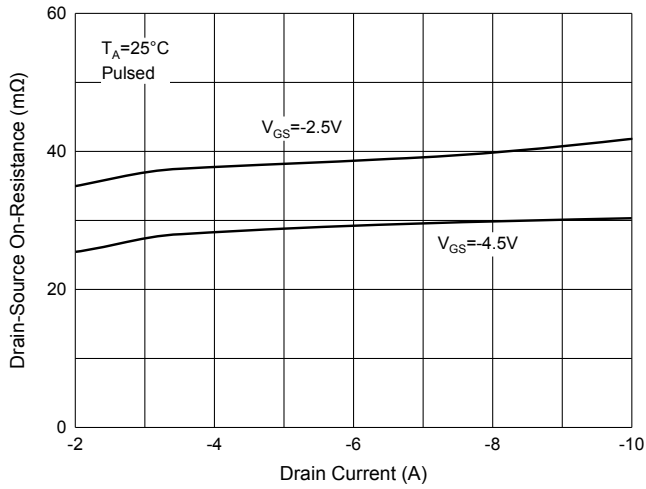


Fig. 4 - Gate Charge

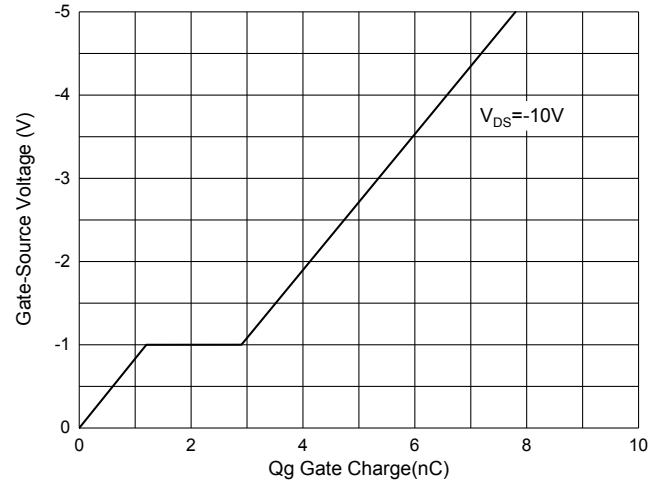


Fig. 5 -  $I_S - V_{SD}$

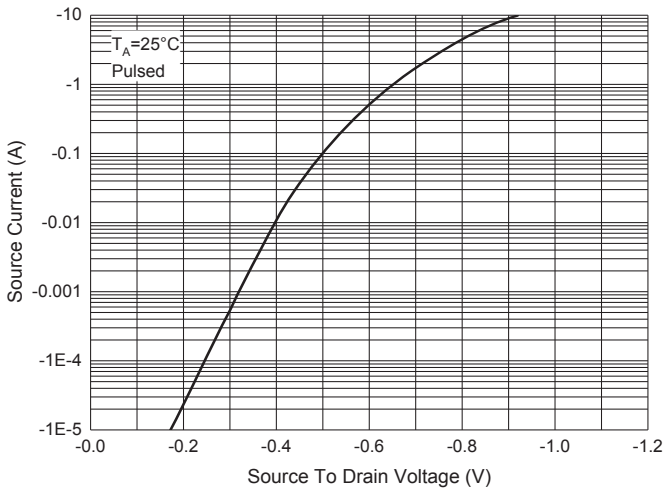
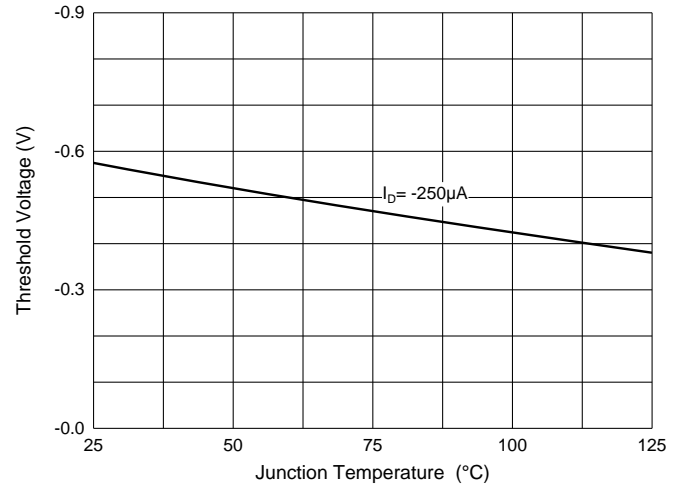


Fig. 6 - Threshold Voltage



## Ordering Information

Device	Packing
Part Number-TP	Tape&Reel: 3Kpcs/Reel

Note : Adding "-HF" Suffix For Halogen Free, eg. Part Number-TP-HF

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