

## P-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY		
$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
- 30	0.0075 at $V_{GS} = - 10$ V	- 15
	0.011 at $V_{GS} = - 4.5$ V	- 12.3

### FEATURES

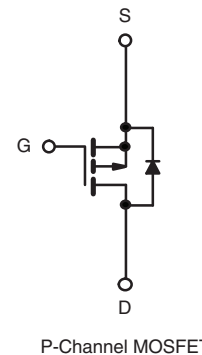
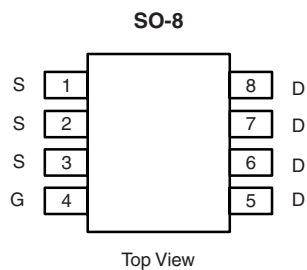
- Halogen-free According to IEC 61249-2-21 Available
- TrenchFET<sup>®</sup> Power MOSFET



**RoHS**  
COMPLIANT  
**HALOGEN**  
**FREE**  
Available

### APPLICATIONS

- Notebook
  - Load Switch
  - Battery Switch



**Ordering Information:** Si4413ADY-T1-E3 (Lead (Pb)-free)  
Si4413ADY-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted					
Parameter	Symbol	10 s	Steady State	Unit	
Drain-Source Voltage	$V_{DS}$	- 30		V	
Gate-Source Voltage	$V_{GS}$	$\pm 20$			
Continuous Drain Current ( $T_J = 150$ °C) <sup>a</sup>	$I_D$	$T_A = 25$ °C	- 15	- 10.5	A
		$T_A = 70$ °C	- 11.8	- 8.3	
Pulsed Drain Current	$I_{DM}$	- 50		A	
Continuous Source Current (Diode Conduction) <sup>a</sup>	$I_S$	- 2.7	- 1.36		
Maximum Power Dissipation <sup>a</sup>	$P_D$	$T_A = 25$ °C	3.0	1.5	W
		$T_A = 70$ °C	1.9	0.95	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 150		°C	

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>a</sup>	$t \leq 10$ s	$R_{thJA}$	33	42	°C/W
	Steady State		70	84	
Maximum Junction-to-Foot (Drain)	Steady State	$R_{thJF}$	16	21	

Notes:

a. Surface Mounted on 1" x 1" FR4 board.

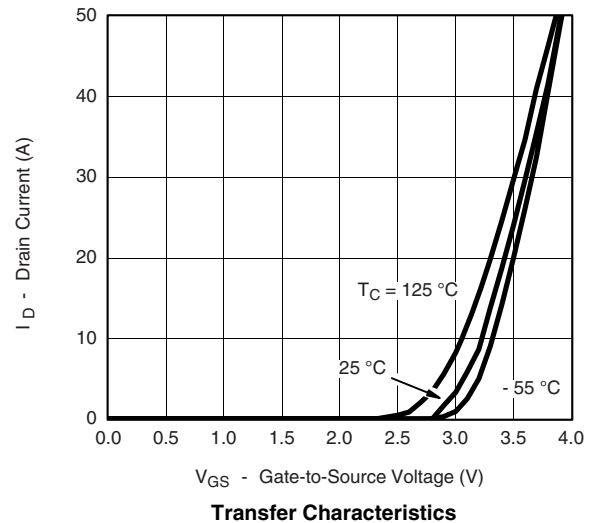
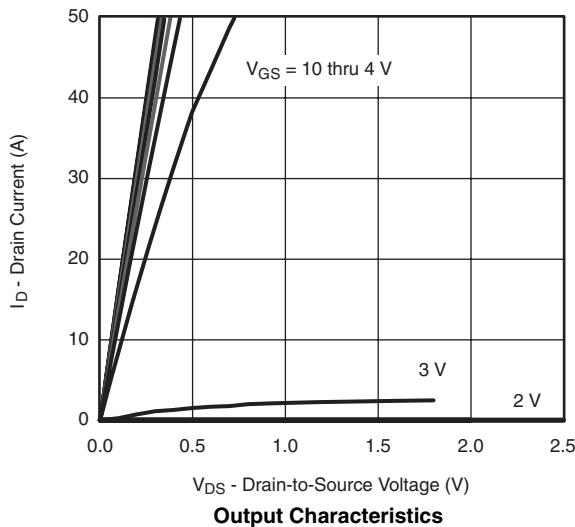
<b>SPECIFICATIONS</b> $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-1.0		-3.0	V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}$			-1	$\mu\text{A}$
		$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}, T_J = 70\text{ }^\circ\text{C}$			-10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -10\text{ V}$	-30			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -13\text{ A}$		0.0063	0.0075	$\Omega$
		$V_{GS} = -4.5\text{ V}, I_D = -10\text{ A}$		0.0083	0.011	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -15\text{ V}, I_D = -13\text{ A}$		50		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = -2.7\text{ A}, V_{GS} = 0\text{ V}$		-0.74	-1.1	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = -15\text{ V}, V_{GS} = -5\text{ V}, I_D = -13\text{ A}$		61	95	nC
Gate-Source Charge	$Q_{gs}$			15.5		
Gate-Drain Charge	$Q_{gd}$			32		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}, R_L = 15\text{ }\Omega$ $I_D \cong -1\text{ A}, V_{GEN} = -10\text{ V}, R_G = 6\text{ }\Omega$		21	35	ns
Rise Time	$t_r$			18	30	
Turn-Off Delay Time	$t_{d(off)}$			170	260	
Fall Time	$t_f$			97	150	
Gate Resistance	$R_g$				3.4	
Source-Drain Reverse Recovery Time	$t_{rr}$	$I_F = -2.1\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		70	110	ns

Notes:

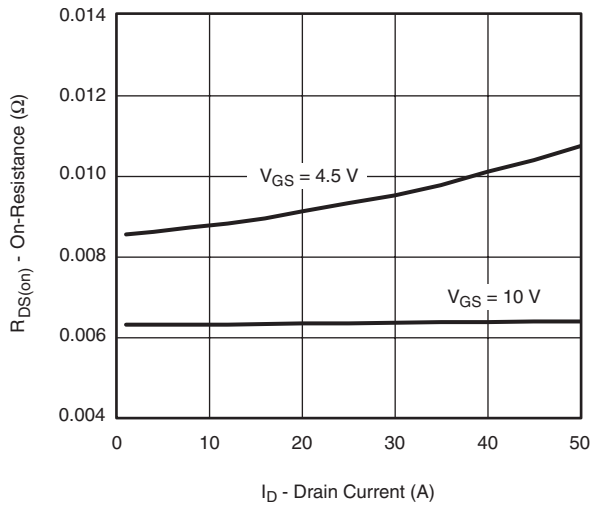
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

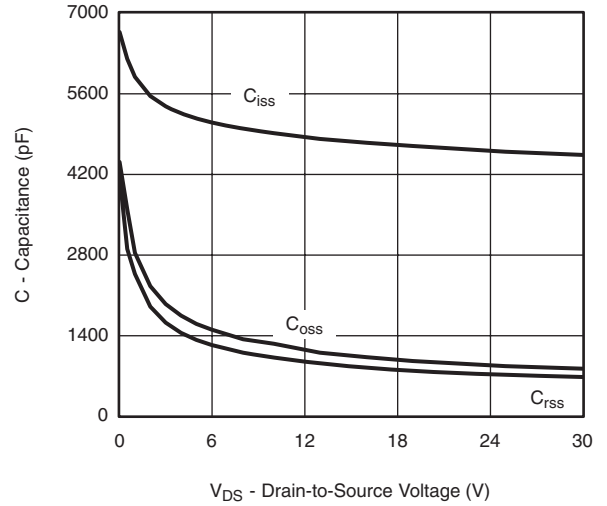
## TYPICAL CHARACTERISTICS $25\text{ }^\circ\text{C}$ , unless otherwise noted



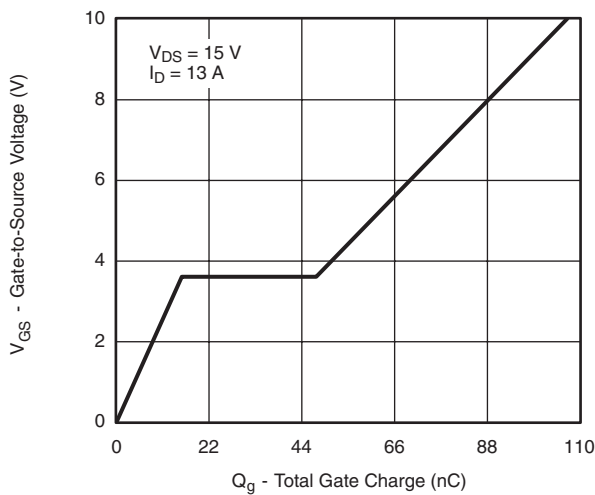
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



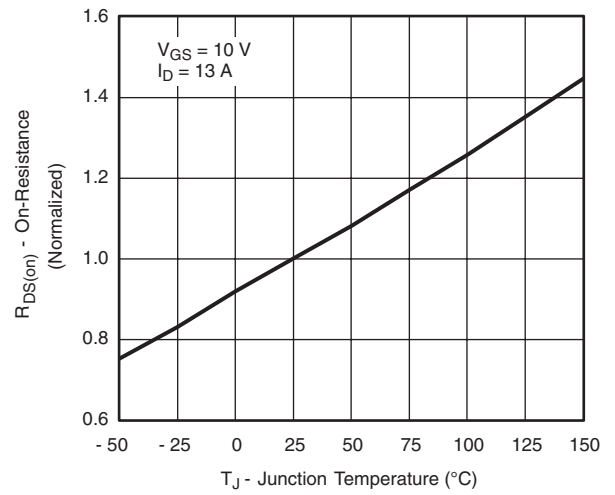
**On-Resistance vs. Drain Current**



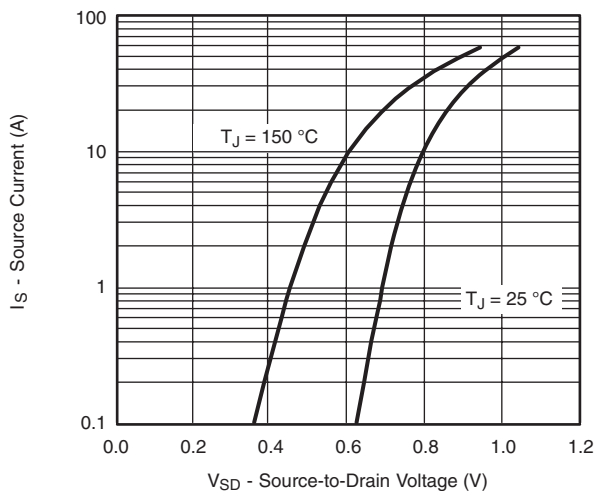
**Gate Charge**



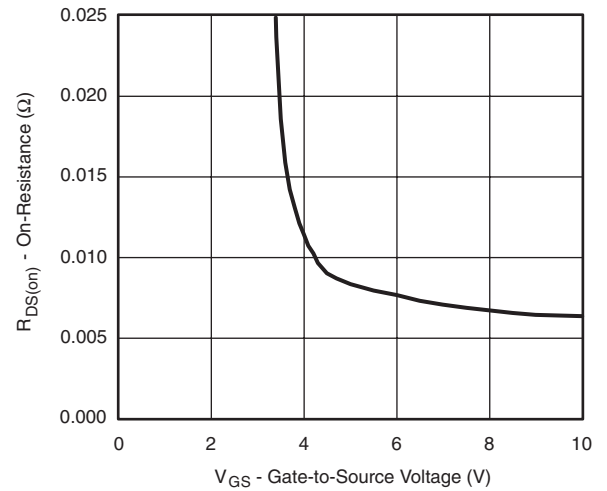
**Source-Drain Diode Forward Voltage**



**Capacitance**

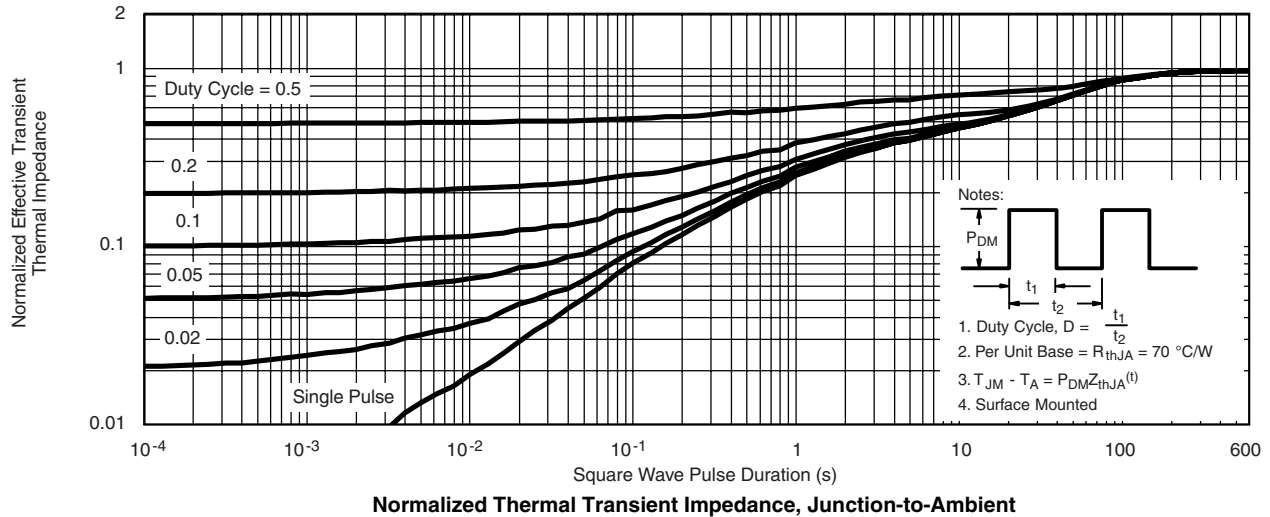
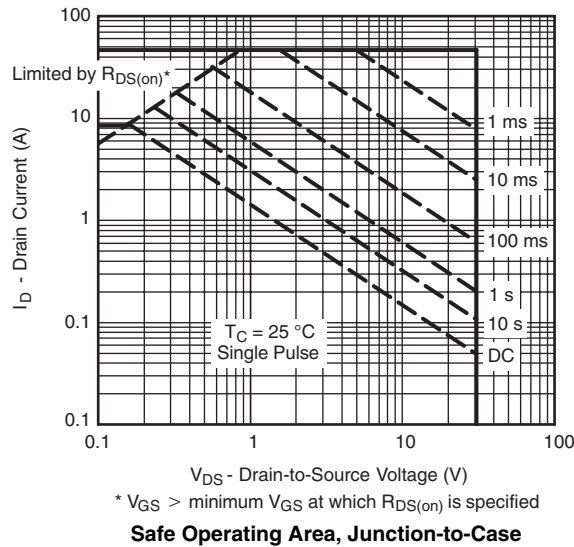
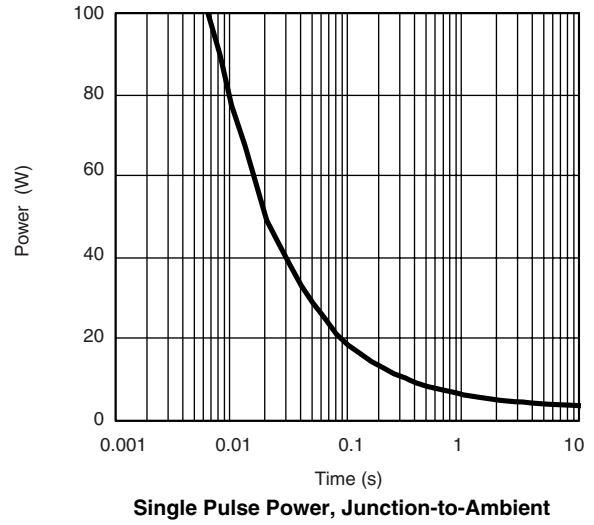
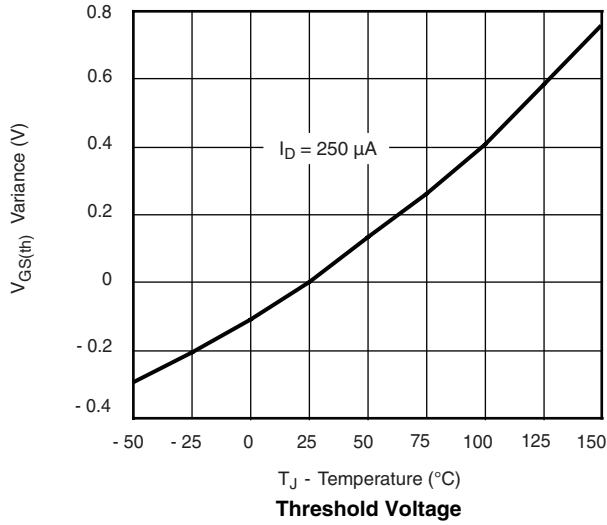


**On-Resistance vs. Junction Temperature**



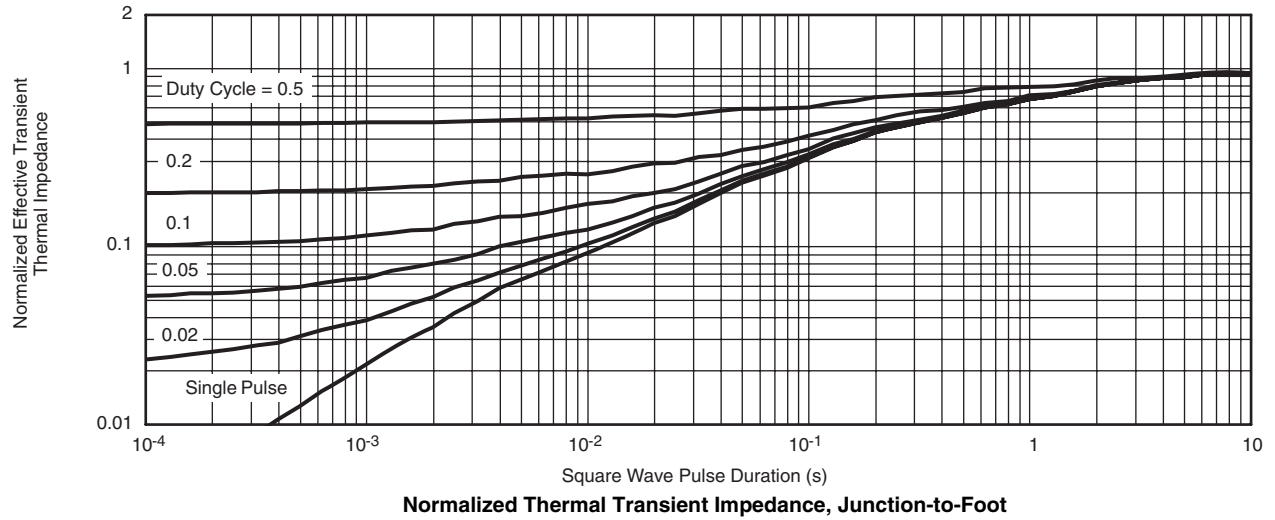
**On-Resistance vs. Gate-to-Source Voltage**

**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted





**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



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## SOIC (NARROW): 8-LEAD

JEDEC Part Number: MS-012



DIM	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A <sub>1</sub>	0.10	0.20	0.004	0.008
B	0.35	0.51	0.014	0.020
C	0.19	0.25	0.0075	0.010
D	4.80	5.00	0.189	0.196
E	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
H	5.80	6.20	0.228	0.244
h	0.25	0.50	0.010	0.020
L	0.50	0.93	0.020	0.037
q	0°	8°	0°	8°
S	0.44	0.64	0.018	0.026
ECN: C-06527-Rev. I, 11-Sep-06				
DWG: 5498				

## RECOMMENDED MINIMUM PADS FOR SO-8



Recommended Minimum Pads  
Dimensions in Inches/(mm)

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