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[SI6413DQ-T1-E3](#)

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**Si6413DQ**  
Vishay Siliconix

## P-Channel 1.8-V (G-S) MOSFET

PRODUCT SUMMARY		
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)
- 20	0.010 at V <sub>GS</sub> = - 4.5 V	- 8.8
	0.013 at V <sub>GS</sub> = - 2.5 V	- 7.6
	0.016 at V <sub>GS</sub> = - 1.8 V	- 6.8

### FEATURES

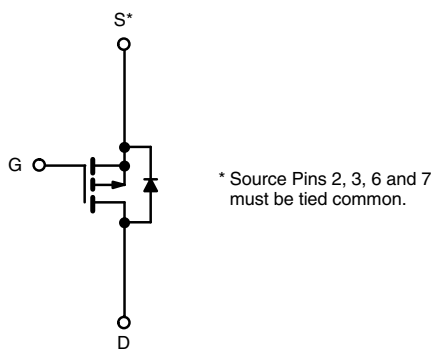
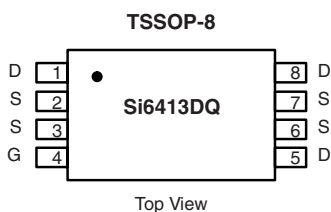
- Halogen-free
- TrenchFET® Power MOSFET



**RoHS**  
COMPLIANT

### APPLICATIONS

- Load Switch
- PA Switch
- Charger Switch



**Ordering Information:** Si6413DQ-T1-GE3 (Lead (Pb)-free and Halogen-free)

P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T <sub>A</sub> = 25 °C, unless otherwise noted				
Parameter	Symbol	10 s	Steady State	Unit
Drain-Source Voltage	V <sub>DS</sub>	- 20		V
Gate-Source Voltage	V <sub>GS</sub>	± 8		
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a</sup>	I <sub>D</sub>	T <sub>A</sub> = 25 °C	- 8.8	- 7.2
		T <sub>A</sub> = 70 °C	- 7.0	- 5.7
Pulsed Drain Current (10 μs Pulse Width)	I <sub>DM</sub>	- 30		A
Continuous Source Current (Diode Conduction) <sup>a</sup>	I <sub>S</sub>	- 1.35	- 0.95	
Maximum Power Dissipation <sup>a</sup>	P <sub>D</sub>	T <sub>A</sub> = 25 °C	1.5	1.05
		T <sub>A</sub> = 70 °C	1.0	0.67
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150		°C

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>a</sup>	t ≤ 10 s	R <sub>thJA</sub>	60	83	°C/W
	Steady State		100	120	
Maximum Junction-to-Foot	Steady State	R <sub>thJF</sub>	35	45	

Notes:

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

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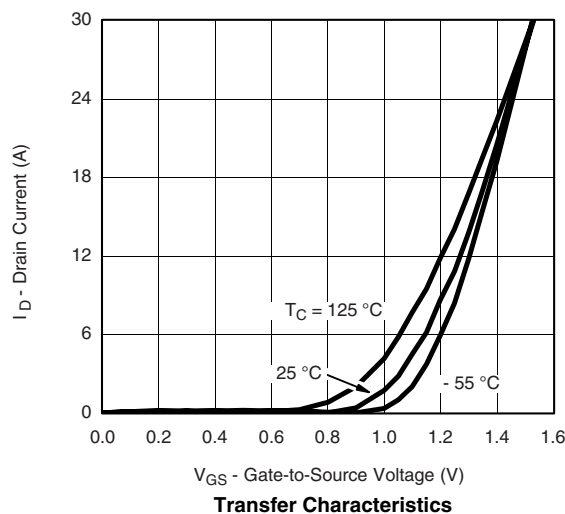
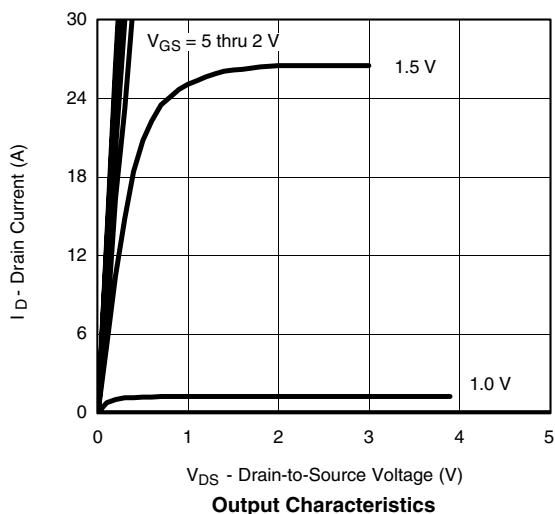
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -400\text{ }\mu\text{A}$	-0.40		-0.8	V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}$			-1	$\mu\text{A}$
		$V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}, T_J = 70\text{ }^\circ\text{C}$			-10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -4.5\text{ V}$	-20			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -8.8\text{ A}$		0.008	0.010	$\Omega$
		$V_{GS} = -2.5\text{ V}, I_D = -7.6\text{ A}$		0.010	0.013	
		$V_{GS} = -1.8\text{ V}, I_D = -6.8\text{ A}$		0.013	0.016	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -15\text{ V}, I_D = -8.8\text{ A}$		45		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = -1.3\text{ A}, V_{GS} = 0\text{ V}$		-0.58	-1.1	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = -10\text{ V}, V_{GS} = -5\text{ V}, I_D = -8.8\text{ A}$		69	105	nC
Gate-Source Charge	$Q_{gs}$			9.5		
Gate-Drain Charge	$Q_{gd}$			15.5		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\text{ V}, R_L = 10\text{ }\Omega$ $I_D \cong -1\text{ A}, V_{GEN} = -4.5\text{ V}, R_G = 6\text{ }\Omega$		55	85	ns
Rise Time	$t_r$			120	200	
Turn-Off Delay Time	$t_{d(off)}$			305	470	
Fall Time	$t_f$			160	250	
Source-Drain Reverse Recovery Time	$t_{rr}$		$I_F = -1.3\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		90	

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.

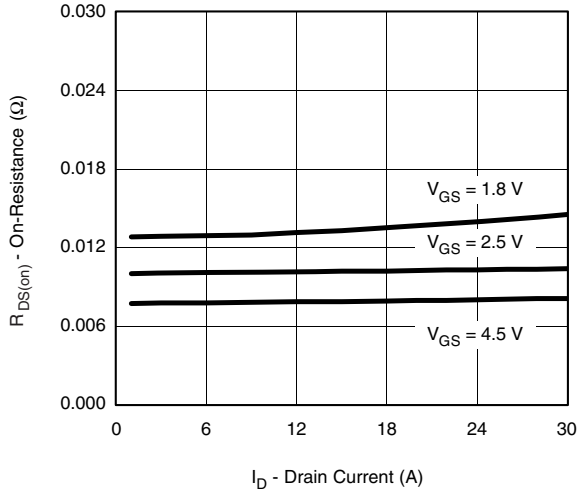
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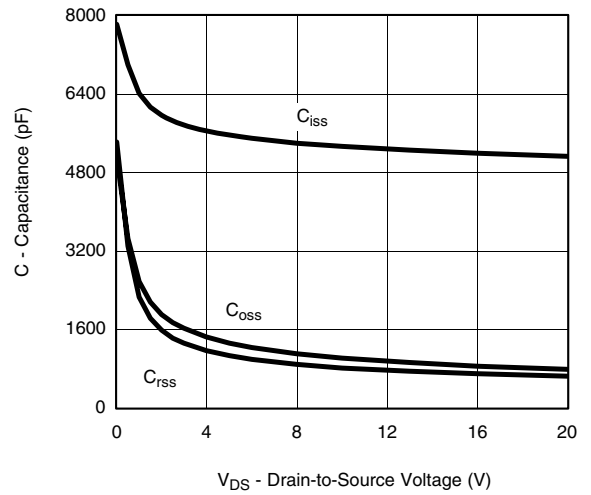


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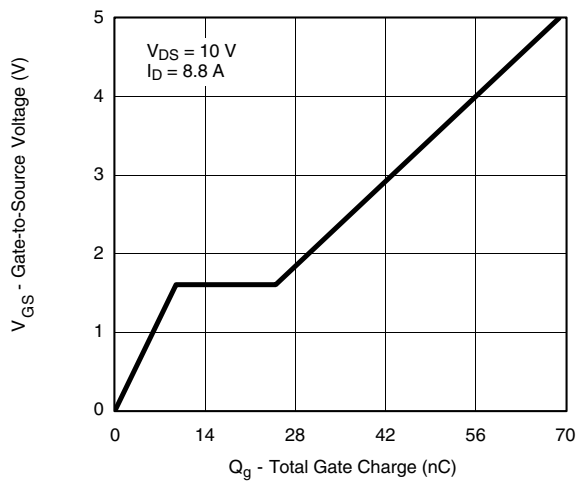
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



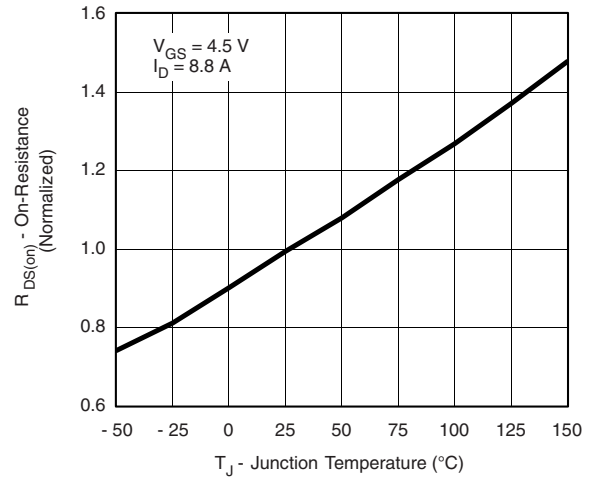
**On-Resistance vs. Drain Current**



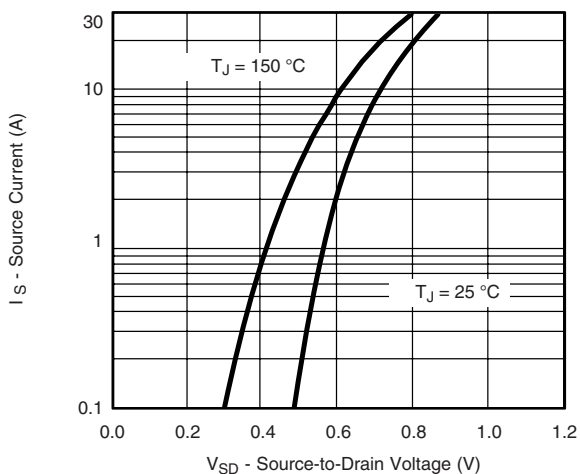
**Capacitance**



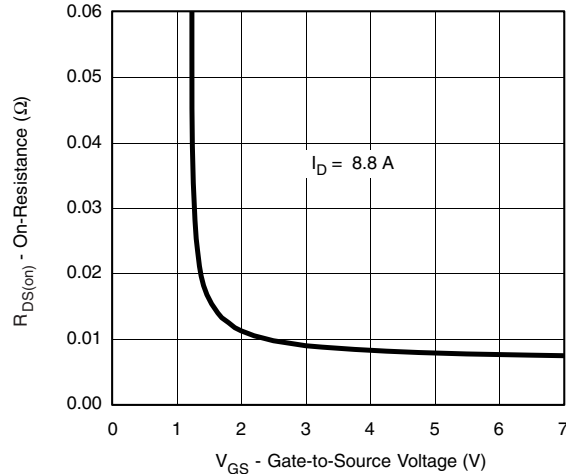
**Gate Charge**



**On-Resistance vs. Junction Temperature**



**Source-Drain Diode Forward Voltage**



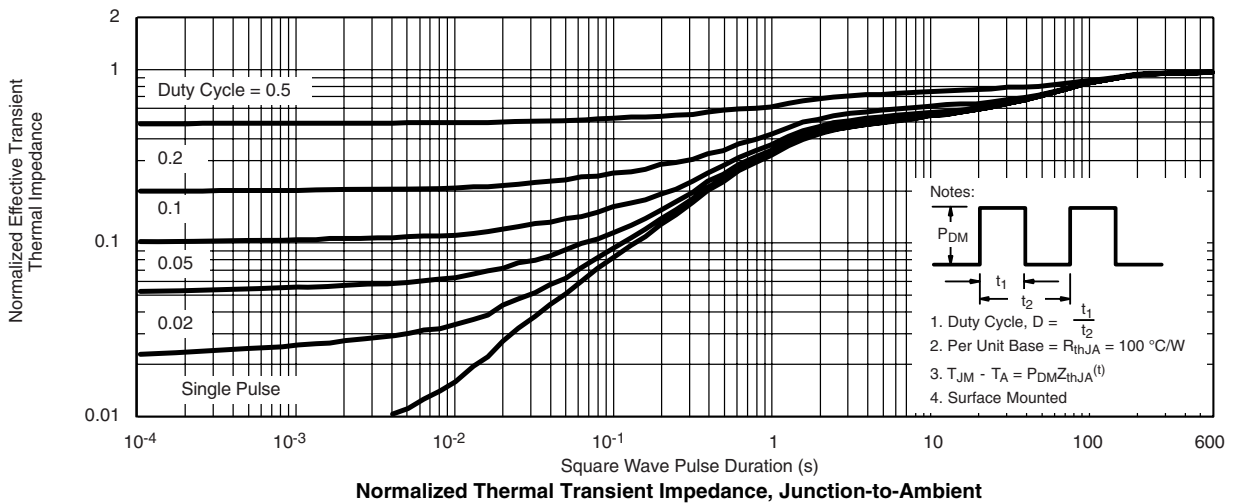
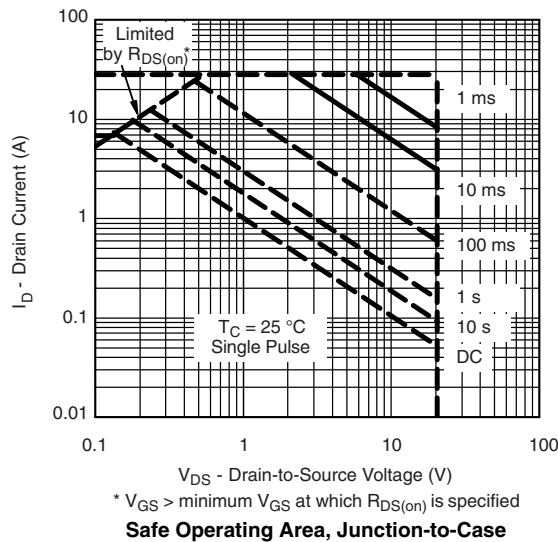
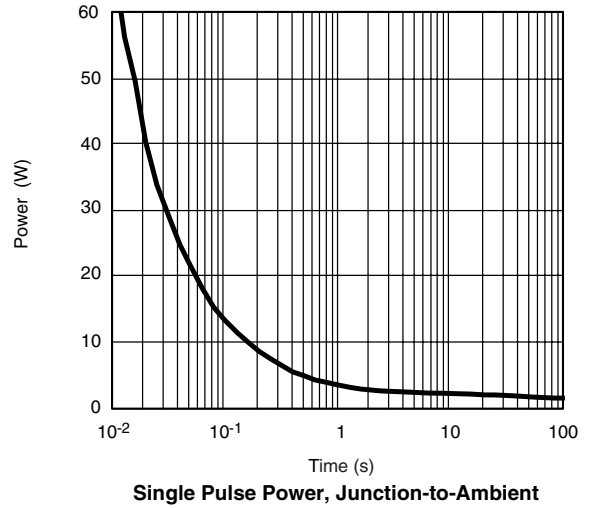
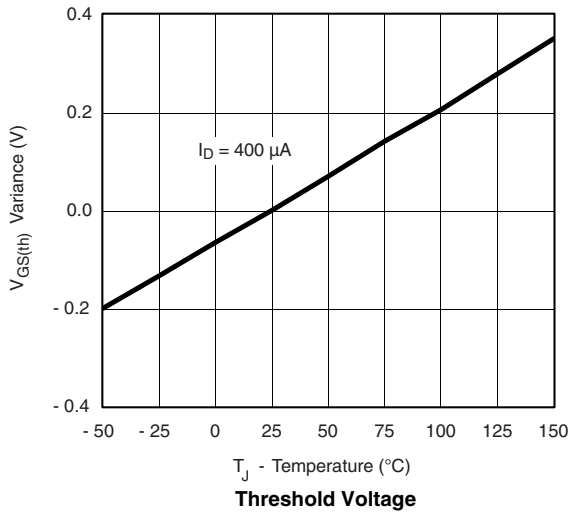
**On-Resistance vs. Gate-to-Source Voltage**

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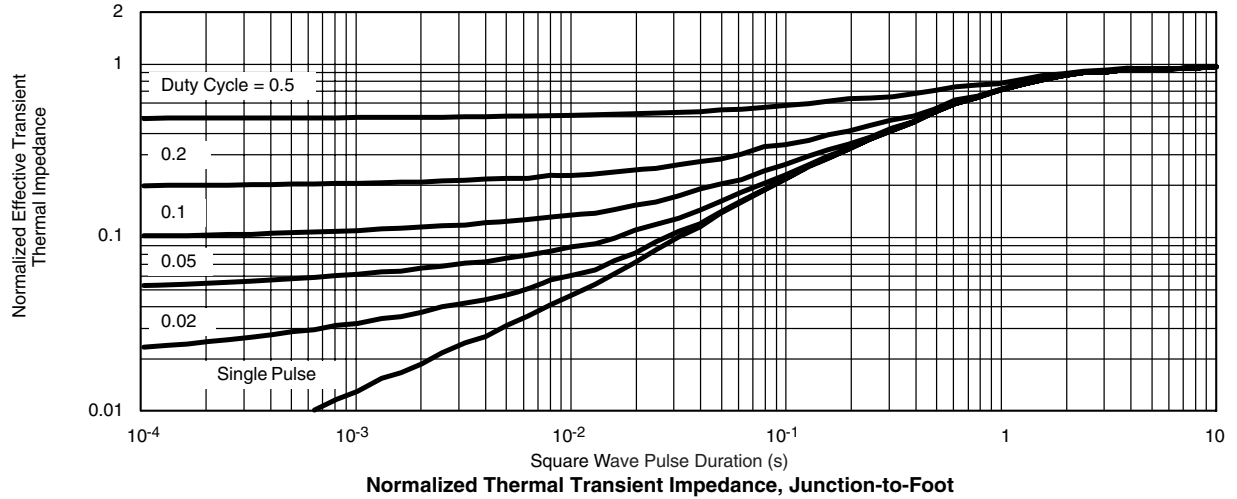
## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted





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



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