

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

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
- 20	0.010 at $V_{GS} = - 4.5$ V	- 8.8
	0.013 at $V_{GS} = - 2.5$ V	- 7.6
	0.016 at $V_{GS} = - 1.8$ V	- 6.8

FEATURES

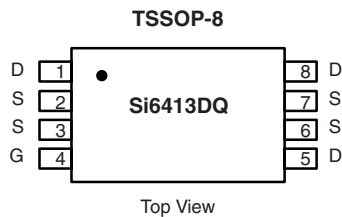
- Halogen-free
- TrenchFET® Power MOSFET

APPLICATIONS

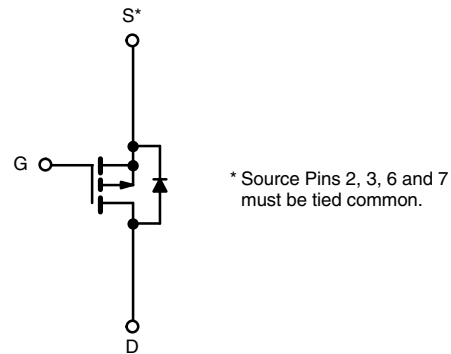
- Load Switch
- PA Switch
- Charger Switch



RoHS
COMPLIANT



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



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	10 s	Steady State	Unit
Drain-Source Voltage	V_{DS}	- 20		V
Gate-Source Voltage	V_{GS}	± 8		
Continuous Drain Current ($T_J = 150^\circ\text{C}$) ^a	I_D	- 8.8	- 7.2	A
		- 7.0	- 5.7	
Pulsed Drain Current (10 μs Pulse Width)	I_{DM}	- 30		
Continuous Source Current (Diode Conduction) ^a	I_S	- 1.35	- 0.95	
Maximum Power Dissipation ^a	P_D	1.5	1.05	W
		1.0	0.67	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150		$^\circ\text{C}$

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^a	R_{thJA}	60	83	$^\circ\text{C/W}$
		100	120	
Maximum Junction-to-Foot	R_{thJF}	35	45	

Notes:

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

SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted

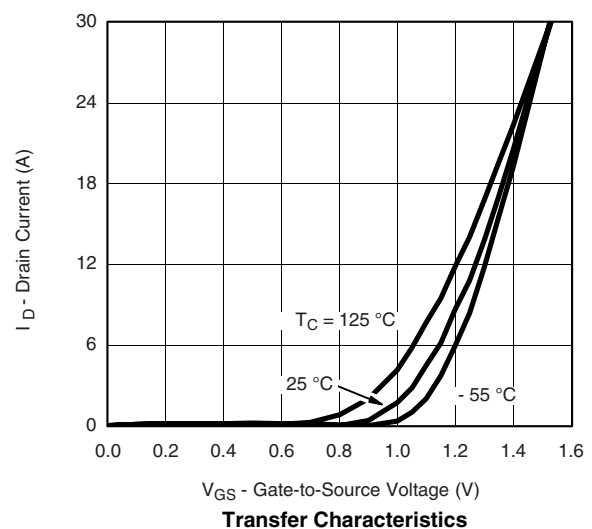
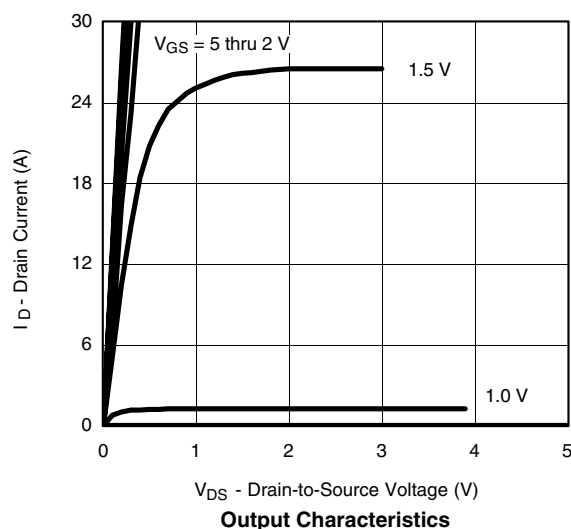
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -400\text{ }\mu\text{A}$	- 0.40		- 0.8	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 8\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -16\text{ V}$, $V_{GS} = 0\text{ V}$			- 1	μA
		$V_{DS} = -16\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 70\text{ }^{\circ}\text{C}$			- 10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = -5\text{ V}$, $V_{GS} = -4.5\text{ V}$	- 20			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}$, $I_D = -8.8\text{ A}$		0.008	0.010	Ω
		$V_{GS} = -2.5\text{ V}$, $I_D = -7.6\text{ A}$		0.010	0.013	
		$V_{GS} = -1.8\text{ V}$, $I_D = -6.8\text{ A}$		0.013	0.016	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15\text{ V}$, $I_D = -8.8\text{ A}$		45		S
Diode Forward Voltage ^a	V_{SD}	$I_S = -1.3\text{ A}$, $V_{GS} = 0\text{ V}$		- 0.58	- 1.1	V
Dynamic^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	150	

Notes:

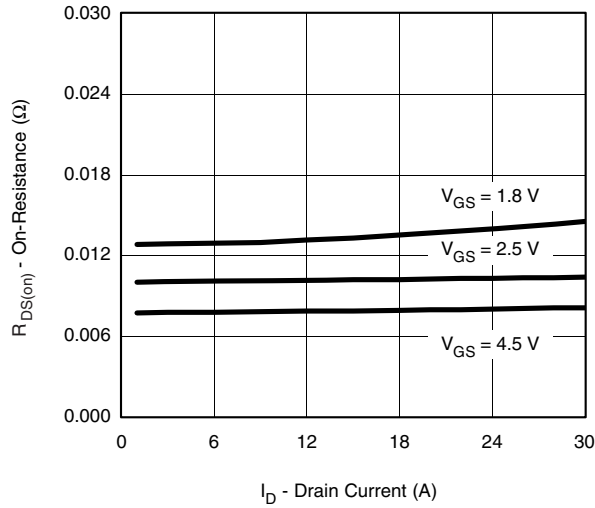
a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

b. Guaranteed by design, not subject to production testing.

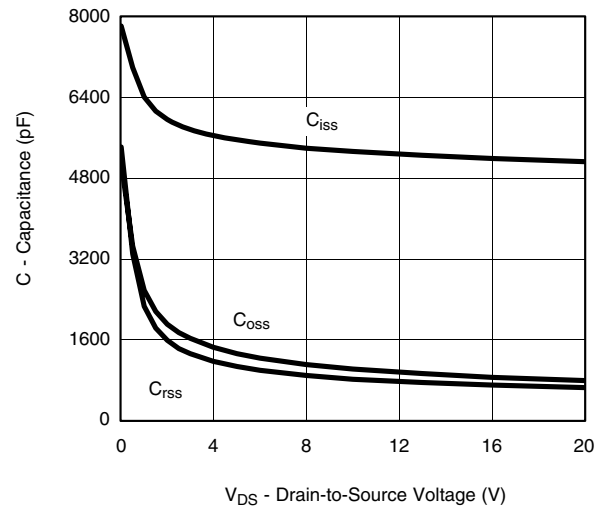
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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

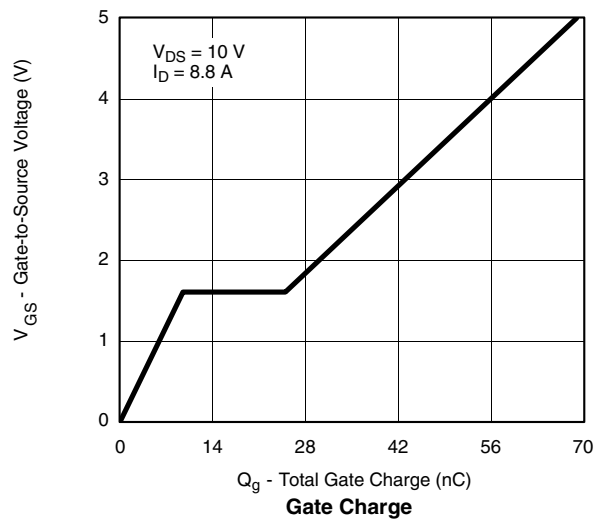
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



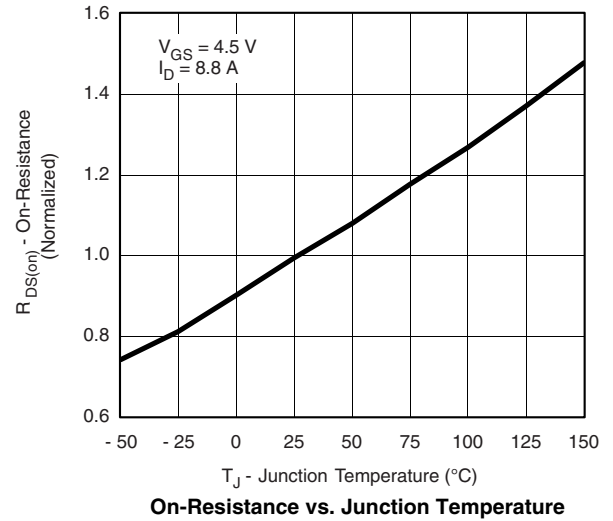
On-Resistance vs. Drain Current



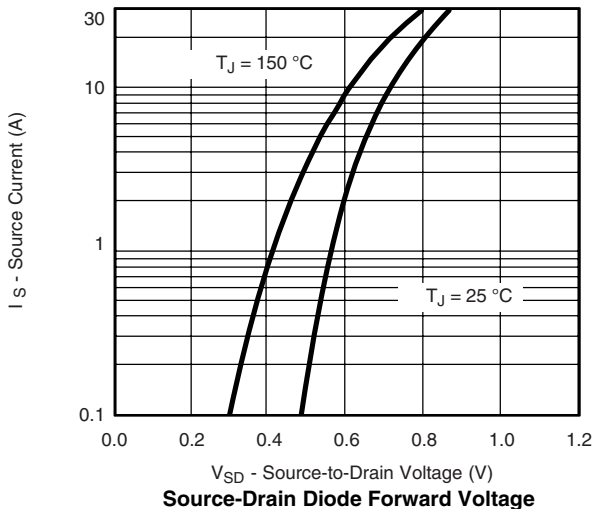
Capacitance



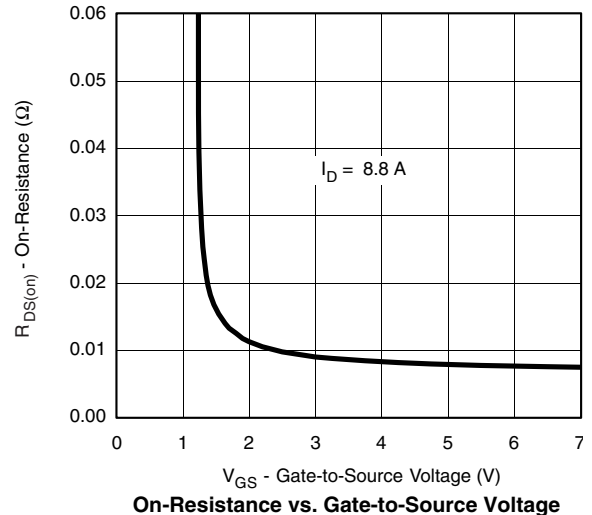
Gate Charge



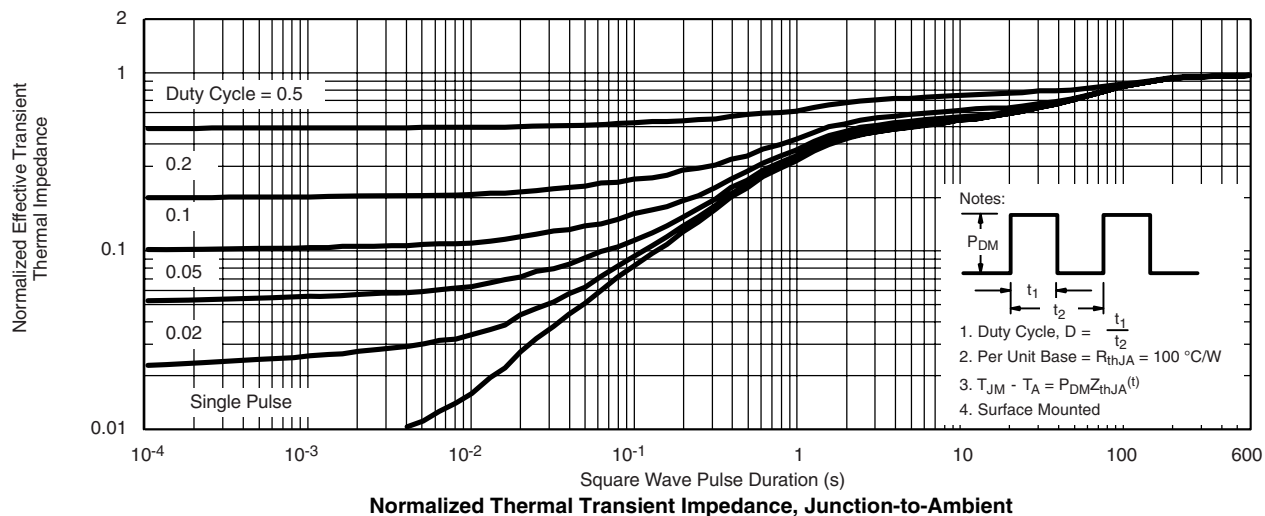
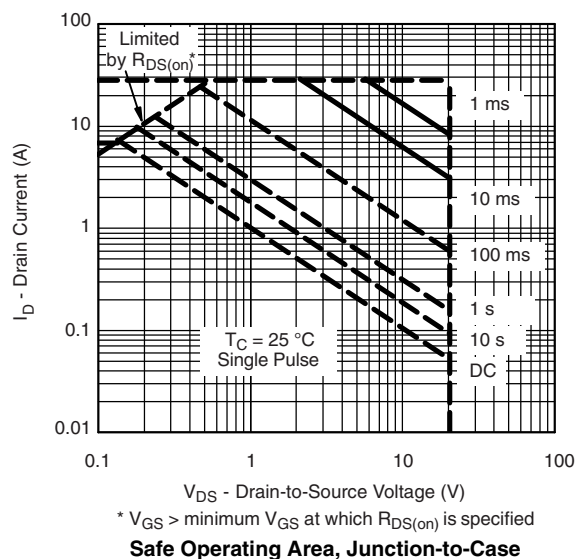
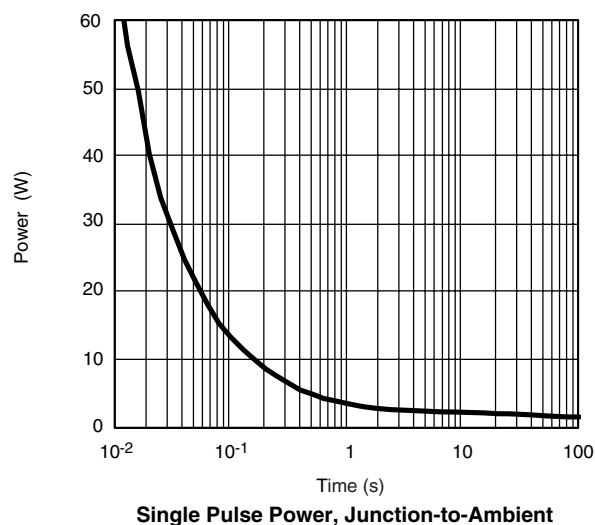
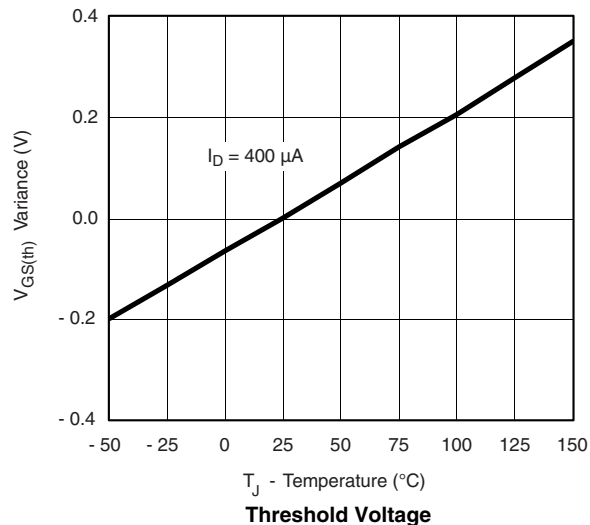
On-Resistance vs. Junction Temperature



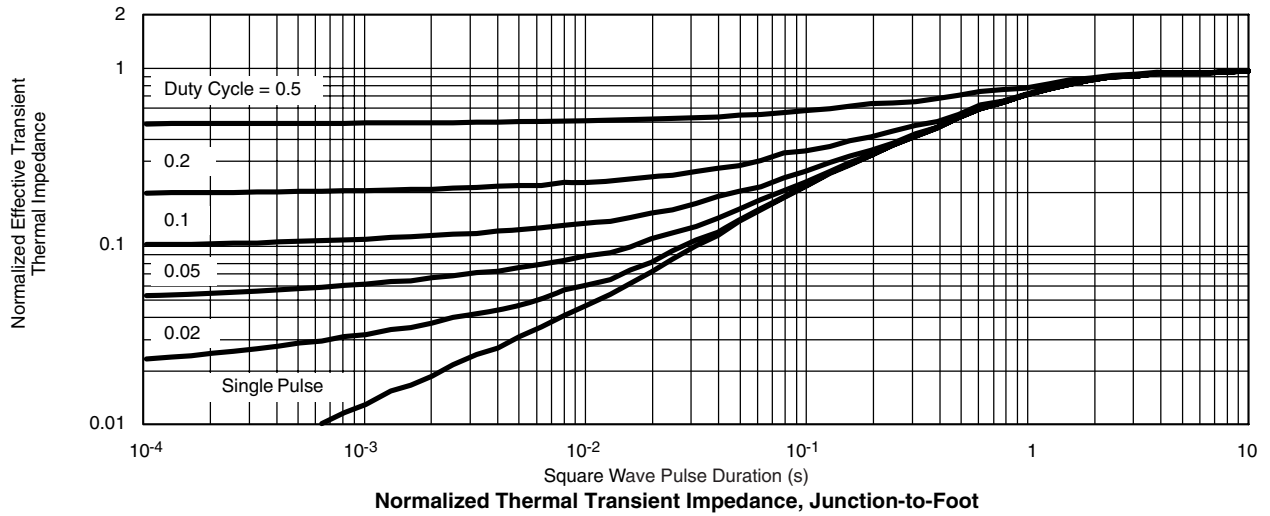
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

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