

SI6413DQ-T1-E3-VB Datasheet

P-Channel 20-V (G-S) MOSFET

PRODUCT SUMMARY

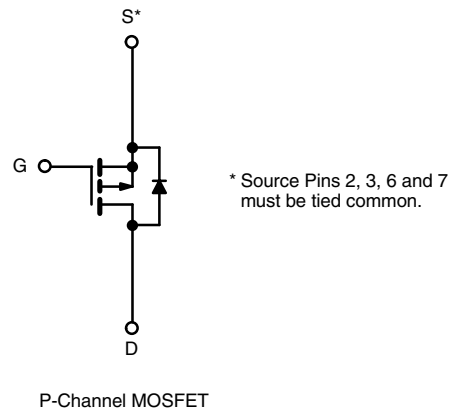
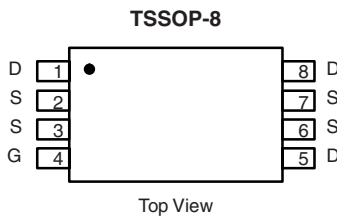
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
-20	0.010 at $V_{GS} = -4.5$ V	-9.0
	0.012 at $V_{GS} = -2.5$ V	-7.8
	0.016 at $V_{GS} = -1.8$ V	-6.0

FEATURES

- Halogen-free
- Trench Power MOSFETs



RoHS*
COMPLIANT



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}	± 12		
Continuous Drain Current ($T_J = 150\text{ }^{\circ}\text{C}$) ^a	$T_A = 25\text{ }^{\circ}\text{C}$	I_D	- 9.0	-7.8	A
	$T_A = 70\text{ }^{\circ}\text{C}$		- 6.8	-5.8	
Pulsed Drain Current (10 μs Pulse Width)		I_{DM}	- 30		
Continuous Source Current (Diode Conduction) ^a		I_S	- 1.35	- 0.95	W
Maximum Power Dissipation ^a	$T_A = 25\text{ }^{\circ}\text{C}$	P_D	1.5	1.05	
	$T_A = 70\text{ }^{\circ}\text{C}$		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	$t \leq 10$ s	R_{thJA}	65	83	$^\circ\text{C/W}$
	Steady State		100	120	
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	43	52	

Notes:

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

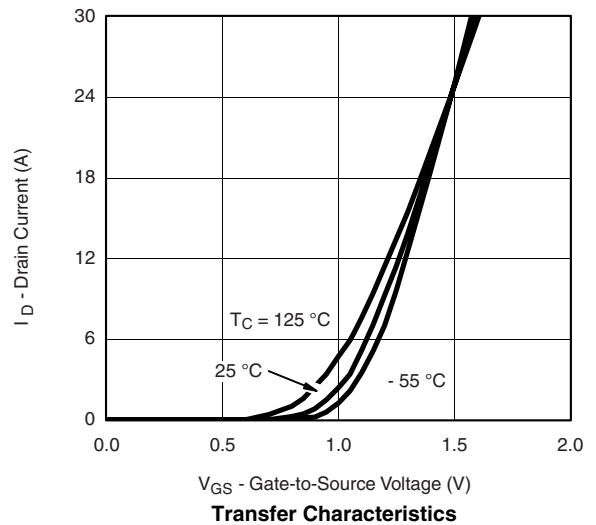
SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -450\text{ }\mu\text{A}$	-0.45	-	1.0	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 8\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -20\text{ V}$, $V_{GS} = 0\text{ V}$			-1	μA
		$V_{DS} = -20\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 70\text{ }^{\circ}\text{C}$			-25	
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	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}$, $I_D = -8.0\text{ A}$		0.010		Ω
		$V_{GS} = -2.5\text{ V}$, $I_D = -7.0\text{ A}$		0.012		
		$V_{GS} = -1.8\text{ V}$, $I_D = -5.8\text{ A}$		0.016		
Forward Transconductance ^a	g_{fs}	$V_{DS} = -5\text{ V}$, $I_D = -8.0\text{ A}$		44		S
Diode Forward Voltage ^a	V_{SD}	$I_S = -1.5\text{ A}$, $V_{GS} = 0\text{ V}$		-0.56	-1.1	V
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = -10\text{ V}$, $V_{GS} = -4.5\text{ V}$, $I_D = -8.0\text{ A}$		46	70	nC
Gate-Source Charge	Q_{gs}			5		
Gate-Drain Charge	Q_{gd}			15.5		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\text{ V}$, $R = 6\text{ }\Omega$ $I_D \cong -1\text{ A}$, $V_{GEN} = -4.5\text{ V}$, $R_g = 6\text{ }\Omega$		45	70	ns
Rise Time	t_r			85	130	
Turn-Off Delay Time	$t_{d(off)}$			220	400	
Fall Time	t_f			155	235	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = -1.5\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$		140	210	

Notes:

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

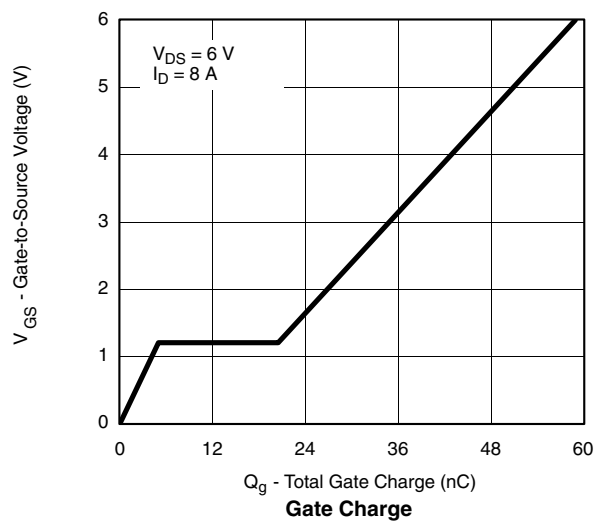
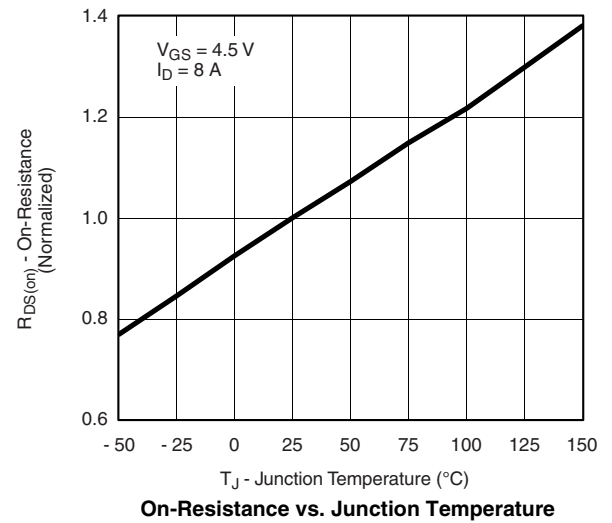
b. Guaranteed by design, not subject to production testing.

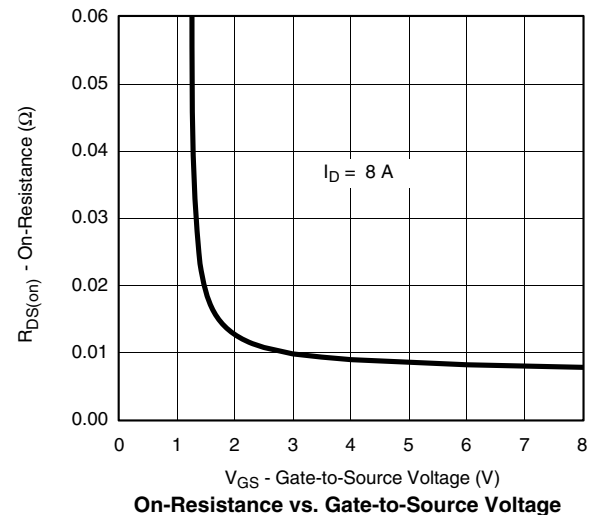
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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

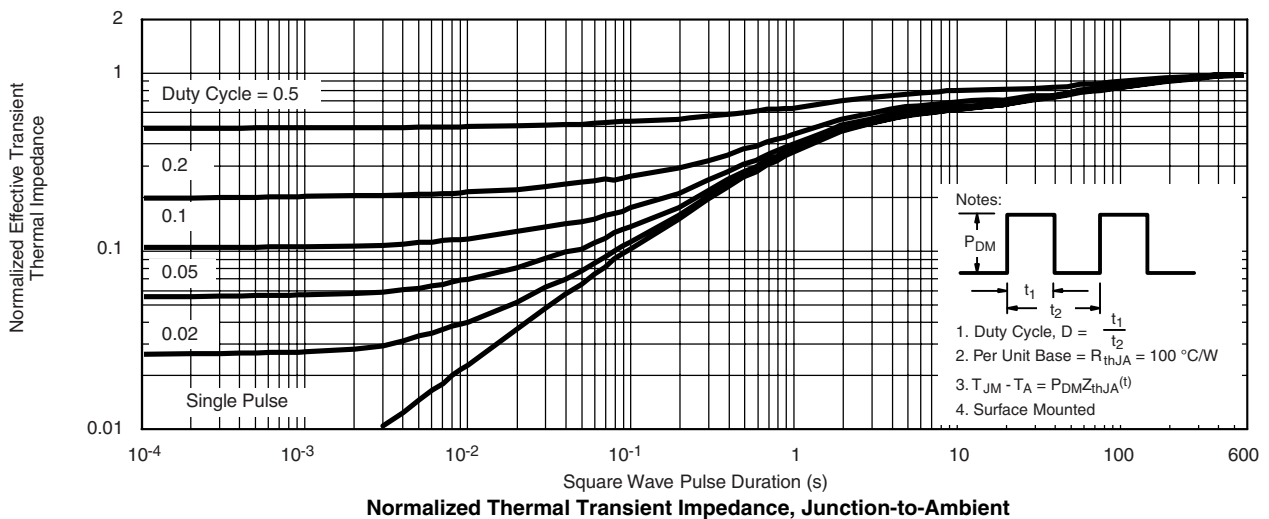
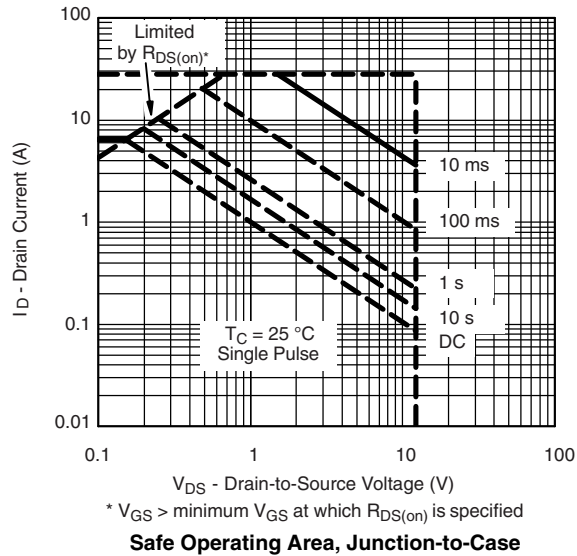
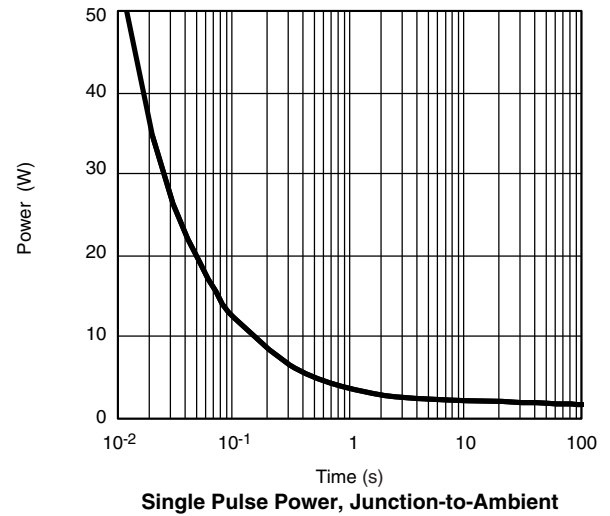
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

On-Resistance vs. Drain Current

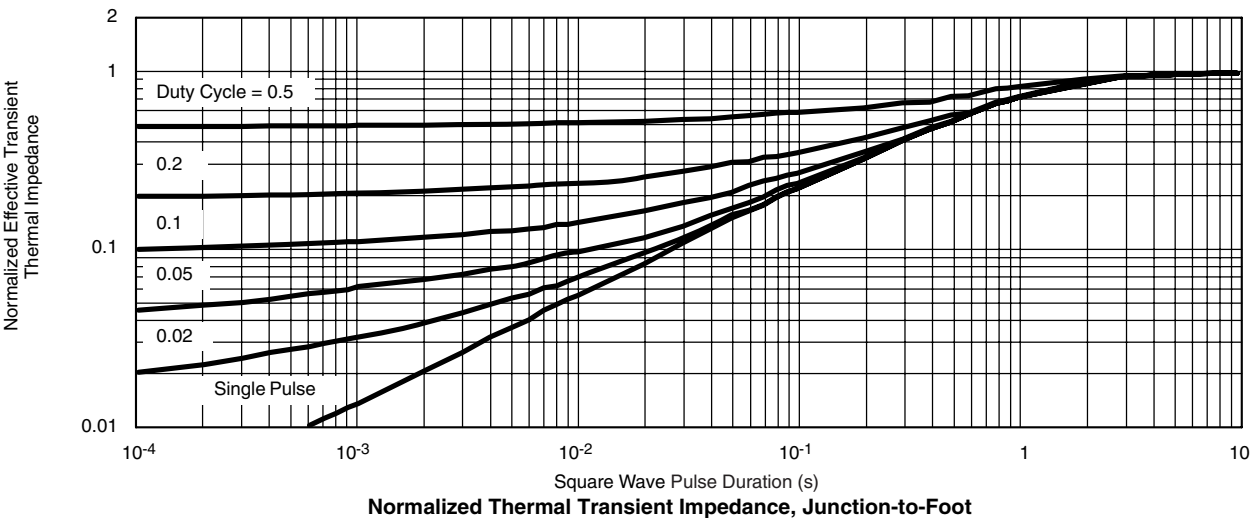
Capacitance

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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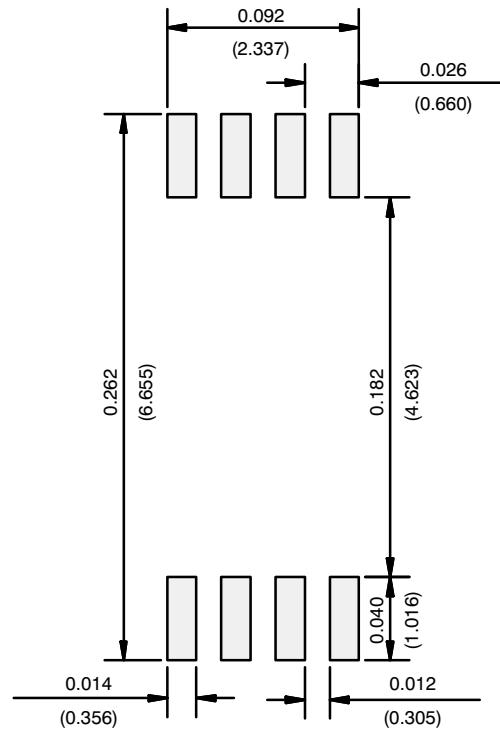


TSSOP: 8-LEAD
JEDEC Part Number: MO-153



Dim	MILLIMETERS		
	Min	Nom	Max
A	—	—	1.20
A ₁	0.05	0.10	0.15
A ₂	0.80	1.00	1.05
B	0.19	0.28	0.30
C	—	0.127	—
D	2.90	3.00	3.10
E	6.20	6.40	6.60
E ₁	4.30	4.40	4.50
e	—	0.65	—
L	0.45	0.60	0.75
L ₁	0.90	1.00	1.10
Y	—	—	0.10
⊘K1	0°	3°	6°
ECN: S-03946—Rev. G, 09-Jul-01 DWG: 5844			

RECOMMENDED MINIMUM PADS FOR TSSOP-8



Recommended Minimum Pads
Dimensions in Inches/(mm)

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