

# SI6993DQ-T1-GE3-VB Datasheet

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

### PRODUCT SUMMARY

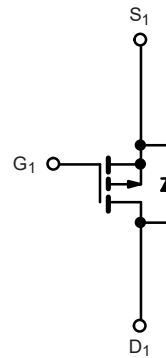
$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
- 30	0.036 at $V_{GS} = - 10$ V	- 5.2
	0.055 at $V_{GS} = - 4.5$ V	- 4.2

### FEATURES

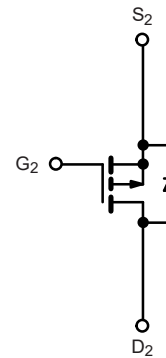
- Halogen-free
- Trench Power MOSFETs

### APPLICATIONS

- Load Switch
- Battery Switch


**RoHS**  
 COMPLIANT


P-Channel MOSFET



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	$V_{DS}$	- 30		V
Gate-Source Voltage	$V_{GS}$	$\pm 20$		
Continuous Drain Current ( $T_J = 150^\circ\text{C}$ ) <sup>a</sup>	$I_D$	- 5.2	- 4.1	A
		- 4.2	- 3.6	
Pulsed Drain Current (10 $\mu\text{s}$ Pulse Width)	$I_{DM}$	- 30		
Continuous Source Current (Diode Conduction) <sup>a</sup>	$I_S$	- 1.0	- 0.70	
Maximum Power Dissipation <sup>a</sup>	$P_D$	1.14	0.83	W
		0.73	0.53	
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 <sup>a</sup>	$R_{thJA}$	86	110	$^\circ\text{C/W}$
		124	150	
Maximum Junction-to-Foot	$R_{thJF}$	52	65	

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
<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	$\mu\text{A}$
		$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^{\circ}\text{C}$			-10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq -5\text{ V}, V_{GS} = -10\text{ V}$	-15			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -4.7\text{ A}$		0.036		$\Omega$
		$V_{GS} = -4.5\text{ V}, I_D = -3.8\text{ A}$		0.055		
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -15\text{ V}, I_D = -4.7\text{ A}$		14		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = -1.0\text{ A}, V_{GS} = 0\text{ V}$		-0.74	-1.1	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = -15\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -4.7\text{ A}$		13	20	nC
Gate-Source Charge	$Q_{gs}$			3		
Gate-Drain Charge	$Q_{gd}$			5.8		
Gate Resistance	$R_g$	$f = 1.0\text{ MHz}$		4.6		$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}, R_L = 15\text{ }\Omega$ $I_D \cong -1\text{ A}, V_{GEN} = -10\text{ V}, R_G = 6\text{ }\Omega$		13	20	ns
Rise Time	$t_r$			14	22	
Turn-Off Delay Time	$t_{d(off)}$			52	80	
Fall Time	$t_f$			26	40	
Source-Drain Reverse Recovery Time	$t_{rr}$	$I_F = -1.0\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}$		40	60	

Notes:

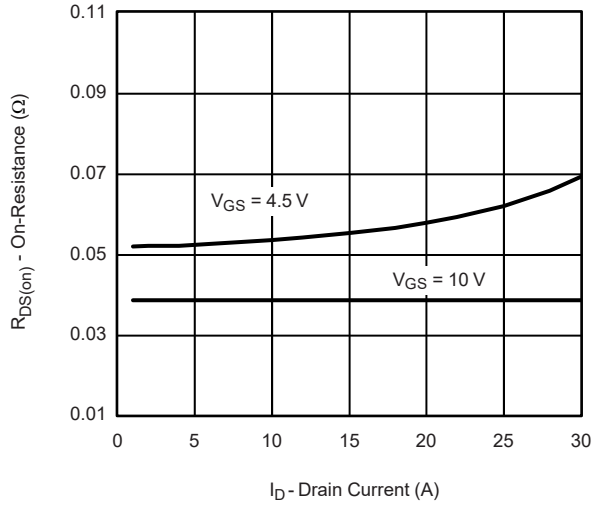
a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

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

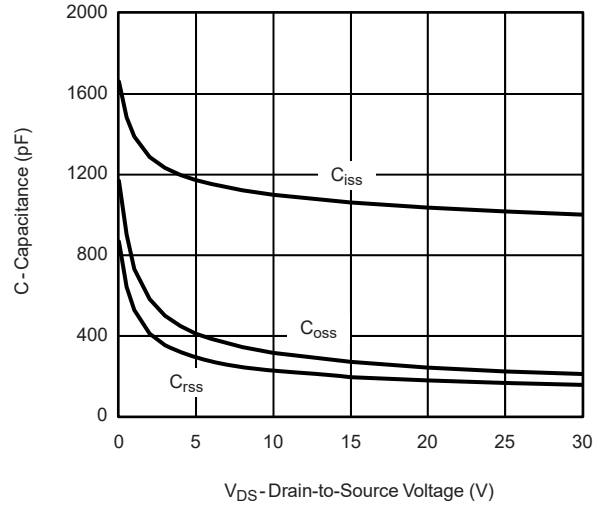
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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

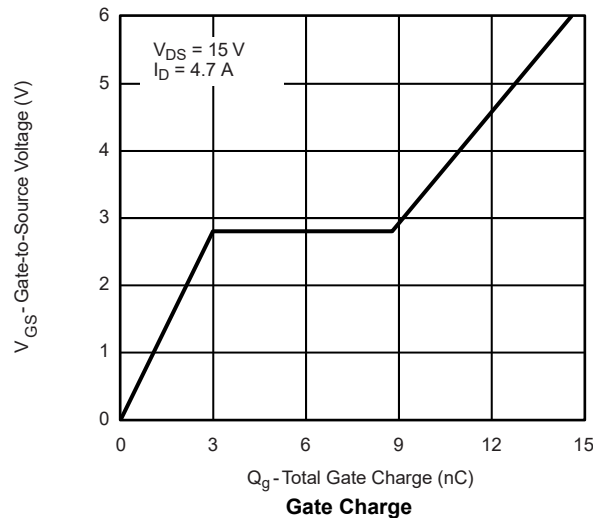
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



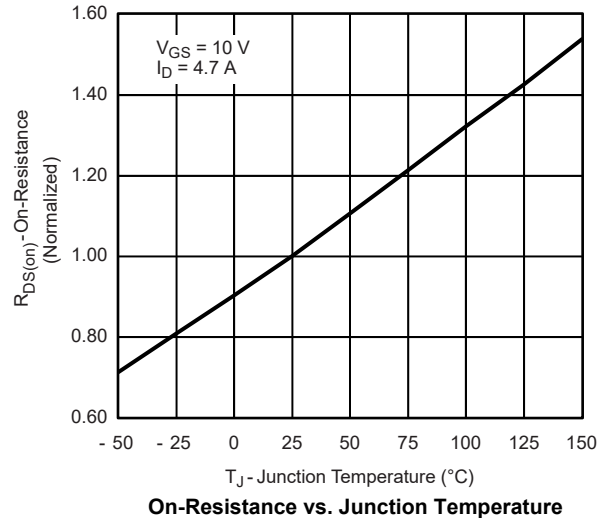
**On-Resistance vs. Drain Current**



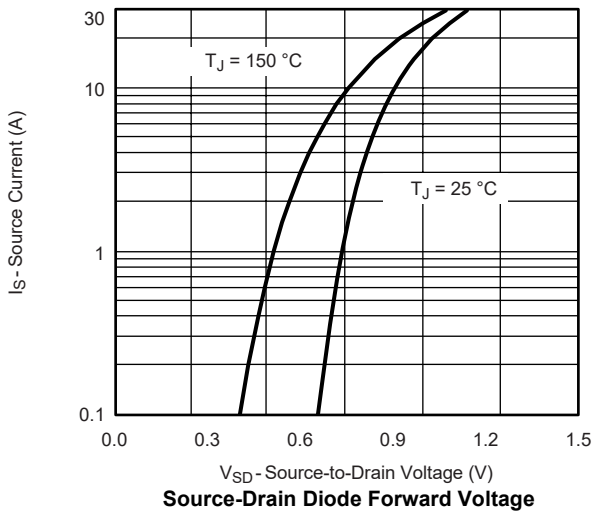
**Capacitance**



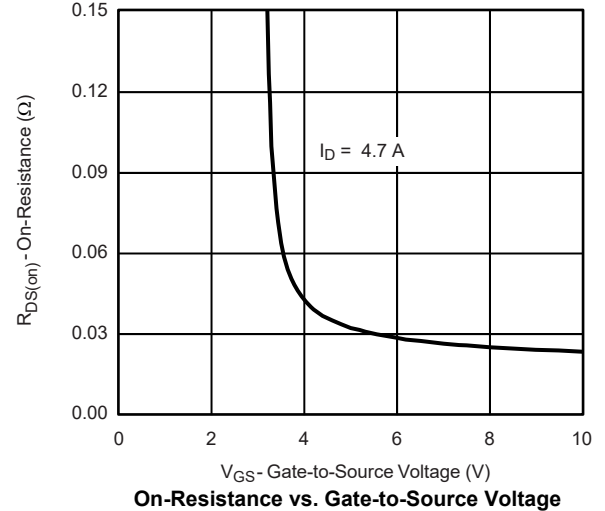
**Gate Charge**



**On-Resistance vs. Junction Temperature**

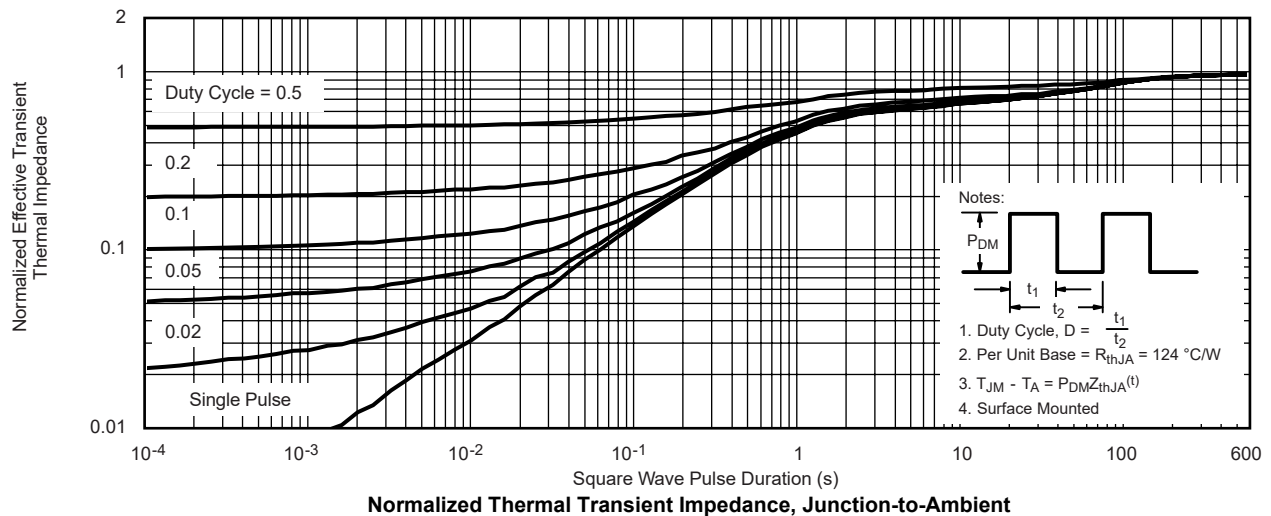
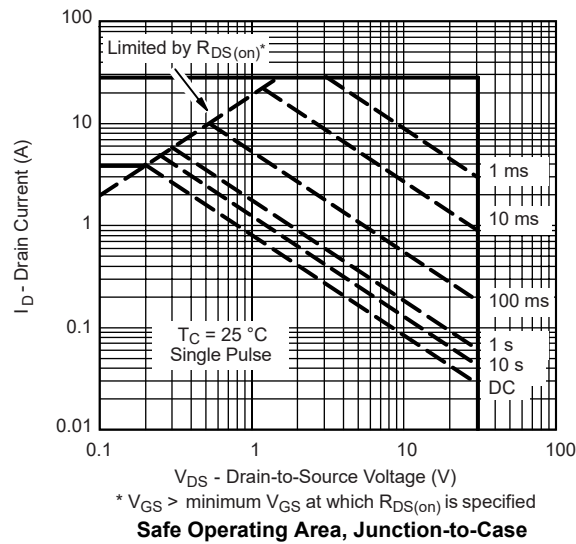
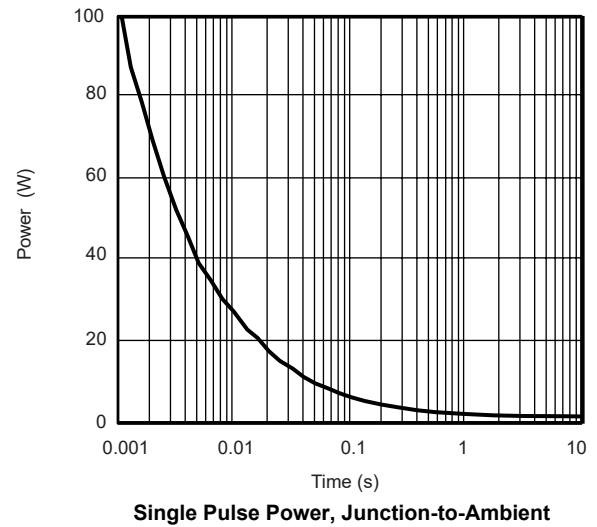
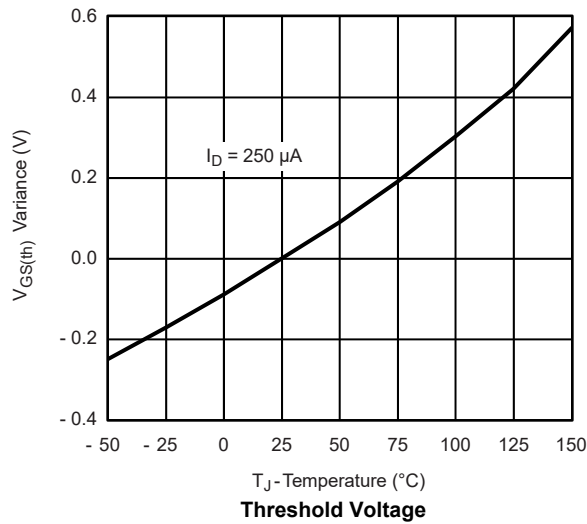


**Source-Drain Diode Forward Voltage**

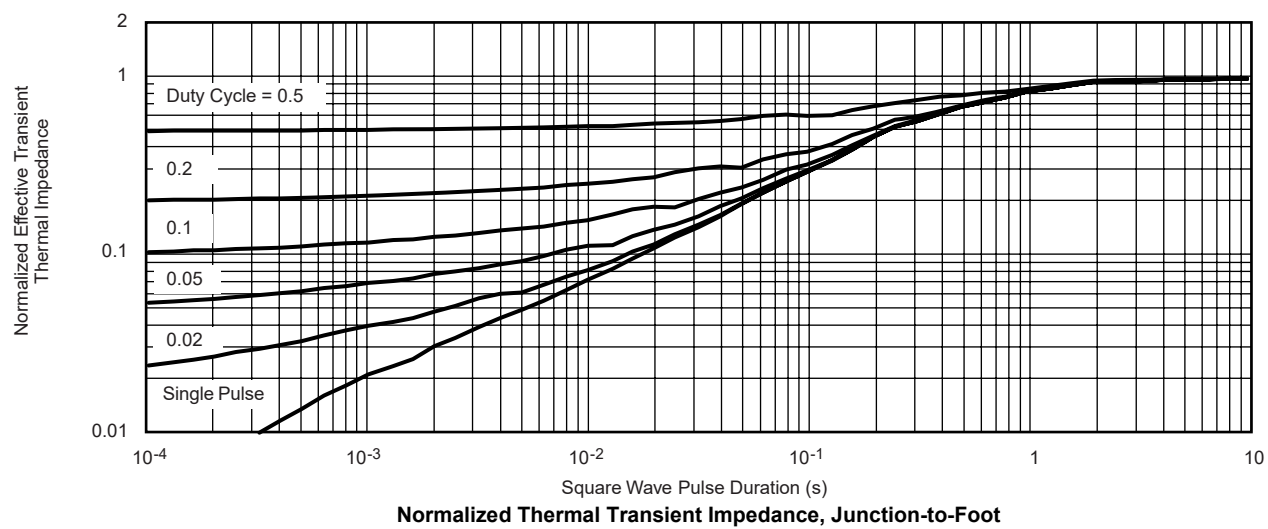


**On-Resistance vs. Gate-to-Source Voltage**

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



## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



## TSSOP-8



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.90	3.10	0.114	0.122
B	4.30	4.50	0.169	0.177
C	---	1.10	---	0.043
D	0.05	0.15	0.002	0.006
F	0.50	0.70	0.020	0.028
G	0.65 BSC		0.026 BSC	
J	0.09	0.20	0.004	0.008
J1	0.09	0.16	0.004	0.006
K	0.19	0.30	0.007	0.012
K1	0.19	0.25	0.007	0.010
L	6.40 BSC		0.252 BSC	
M	0°	8°	0	8°

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