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Vishay/Siliconix
SI6993DQ-T1-E3

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

PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
- 30	0.031 at V_{GS} = - 10 V	- 4.7
	0.048 at V_{GS} = - 4.5 V	- 3.8

FEATURES

- **Halogen-free**
- TrenchFET® Power MOSFETs

Pb-free
RoHS COMPLIANT

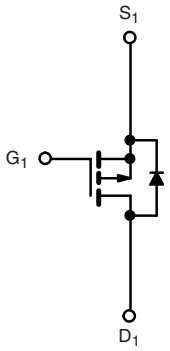
APPLICATIONS

- Load Switch
- Battery Switch

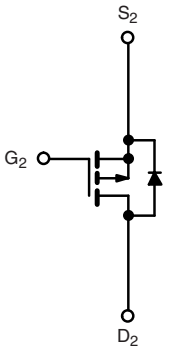
TSSOP-8

Top View

Ordering Information: Si6993DQ-T1-GE3 (Lead (Pb)-free and Halogen-free)



P-Channel MOSFET



P-Channel MOSFET

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}	± 20		
Continuous Drain Current (T_J = 150 °C)[a]	T_A = 25 °C	I_D	- 4.7	- 3.6	A
	T_A = 70 °C		- 3.8	- 3.2	
Pulsed Drain Current (10 µs Pulse Width)		I_{DM}	- 30		
Continuous Source Current (Diode Conduction)[a]		I_S	- 1.0	- 0.70	
Maximum Power Dissipation[a]	T_A = 25 °C	P_D	1.14	0.83	W
	T_A = 70 °C		0.73	0.53	
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[a]	t ≤ 10 s	R_{thJA}	86	110	°C/W
	Steady State		124	150	
Maximum Junction-to-Foot	Steady State	R_{thJF}	52	65	

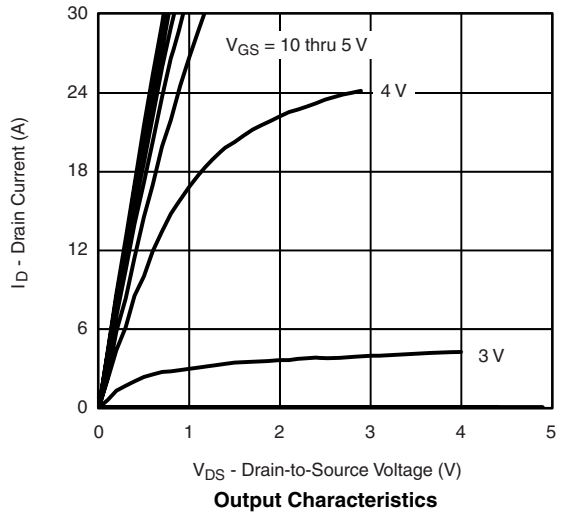
Notes:
a. Surface Mounted on 1" x 1" FR4 board.

SPECIFICATIONS T_J = 25 °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 = - 250 µA	- 1.0		- 3.0	V
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = - 30 V, V_{GS} = 0 V			- 1	µA
		V_{DS} = - 30 V, V_{GS} = 0 V, T_J = 55 °C			- 10	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geq$ - 5 V, V_{GS} = - 10 V	- 15			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = - 10 V, I_D = - 4.7 A		0.024	0.031	Ω
		V_{GS} = - 4.5 V, I_D = - 3.8 A		0.038	0.048	
Forward Transconductance[a]	g_{fs}	V_{DS} = - 15 V, I_D = - 4.7 A		14		S
Diode Forward Voltage[a]	V_{SD}	I_S = - 1.0 A, V_{GS} = 0 V		- 0.74	- 1.1	V
Dynamic[b]						
Total Gate Charge	Q_g	V_{DS} = - 15 V, V_{GS} = - 4.5 V, I_D = - 4.7 A		13	20	nC
Gate-Source Charge	Q_{gs}			3		
Gate-Drain Charge	Q_{gd}			5.8		
Gate Resistance	R_g	f = 1.0 MHz		4.6		Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 15 V, R_L = 15 Ω $I_D \cong$ - 1 A, V_{GEN} = - 10 V, R_G = 6 Ω		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 A, dI/dt = 100 A/µs		40	60	

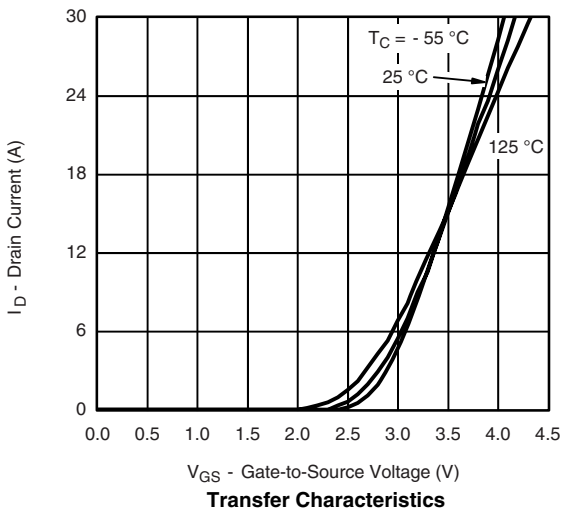
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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 °C, unless otherwise noted

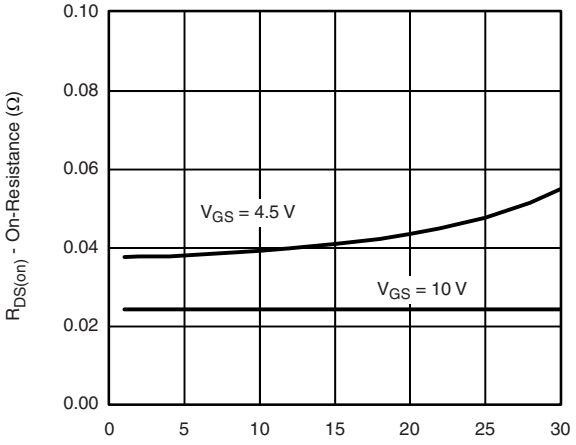


Output Characteristics

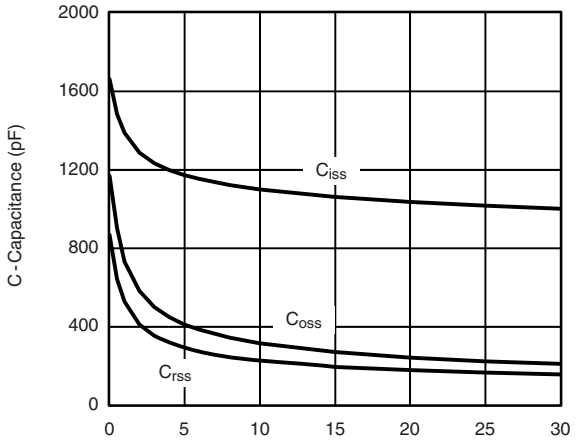


Transfer Characteristics

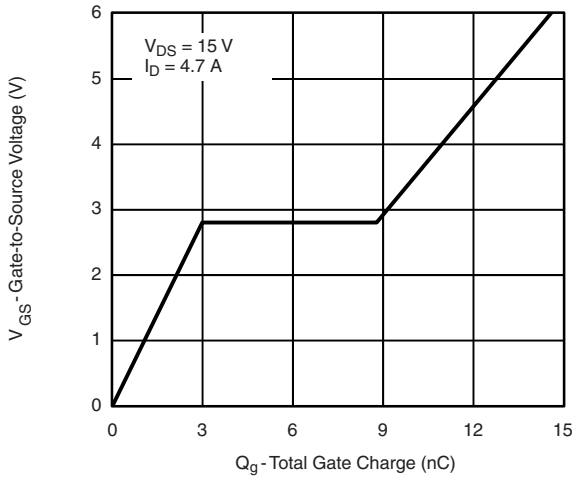
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



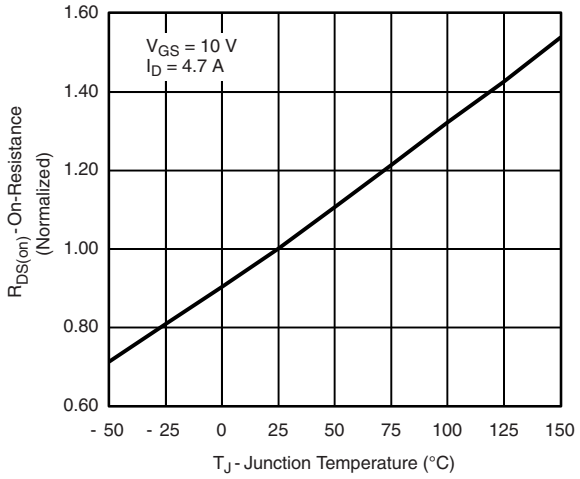
On-Resistance vs. Drain Current



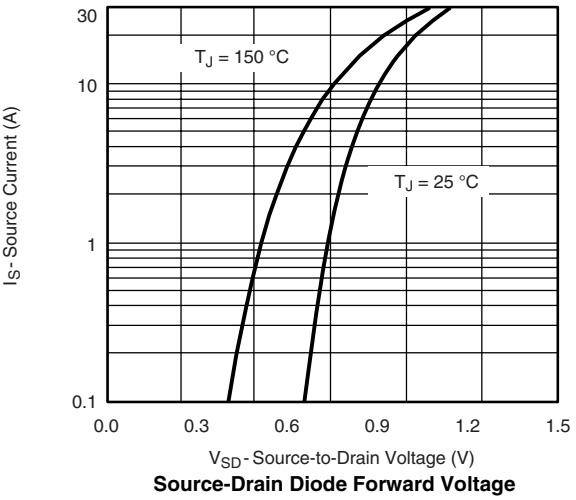
Capacitance



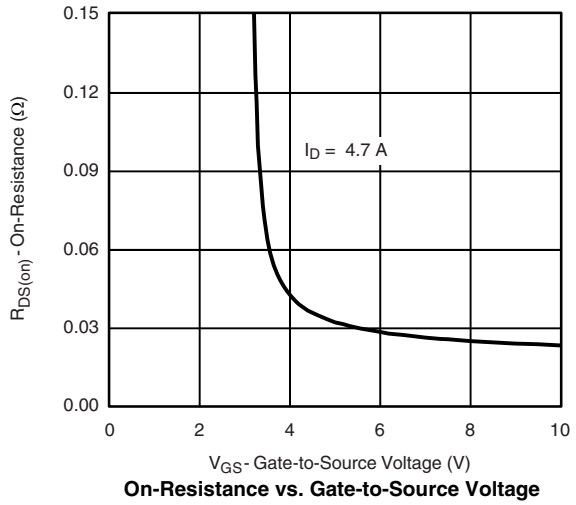
Gate Charge



On-Resistance vs. Junction Temperature

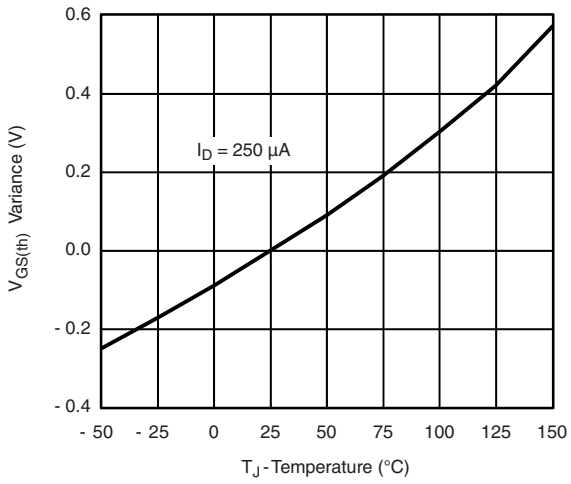


Source-Drain Diode Forward Voltage

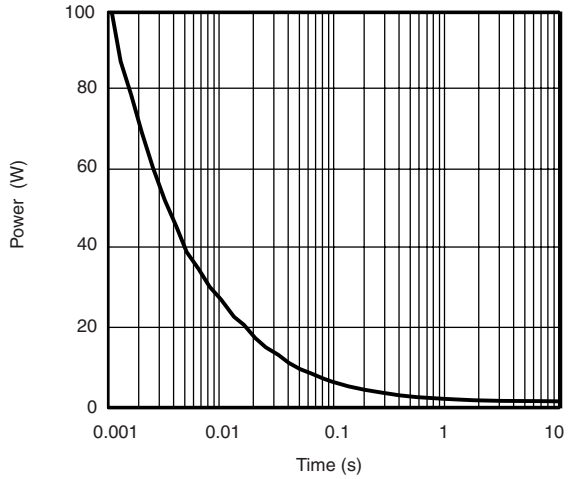


On-Resistance vs. Gate-to-Source Voltage

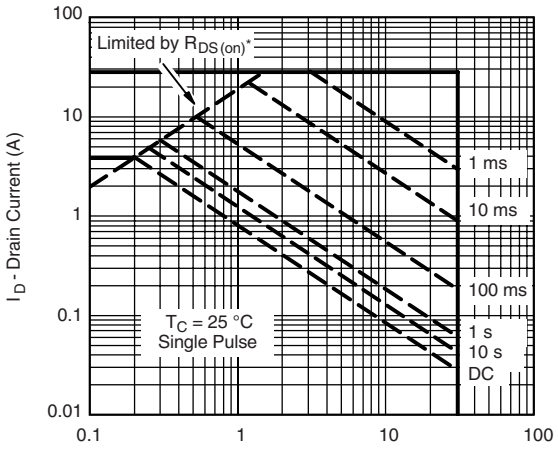
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Threshold Voltage

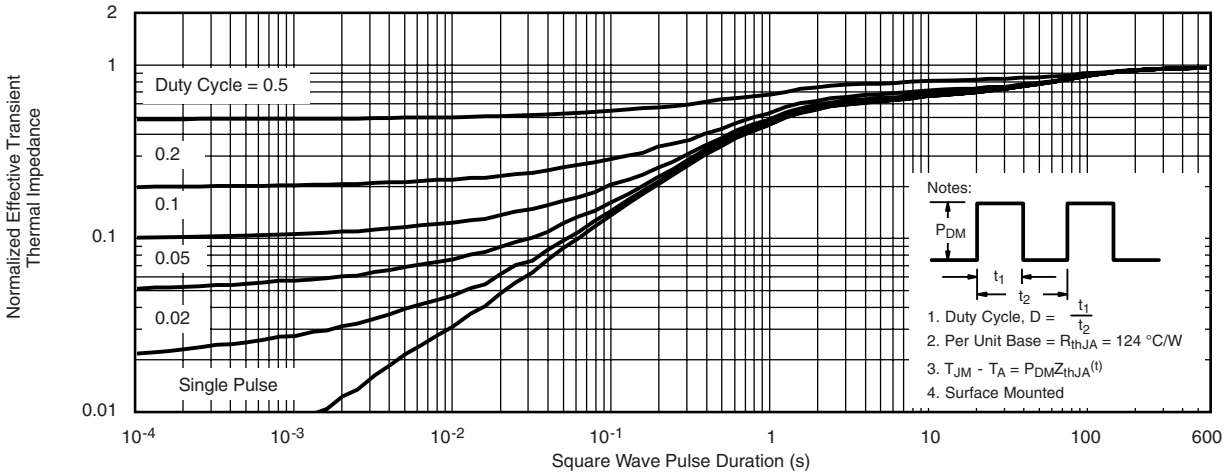


Single Pulse Power, Junction-to-Ambient



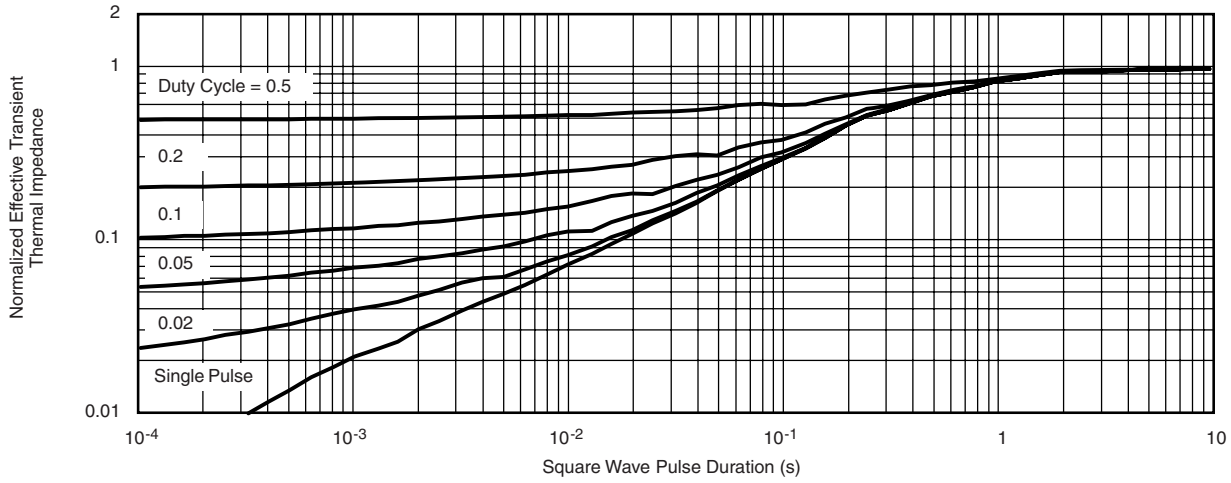
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Case



Normalized Thermal Transient Impedance, Junction-to-Ambient

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Normalized Thermal Transient Impedance, Junction-to-Foot

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