

## Dual P-Channel 20-V (D-S) MOSFET

PRODUCT SUMMARY		
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)
- 20	0.110 at V <sub>GS</sub> = - 4.5 V	- 2.5
	0.145 at V <sub>GS</sub> = - 2.5 V	- 2.0
	0.220 at V <sub>GS</sub> = - 1.8 V	- 1.0

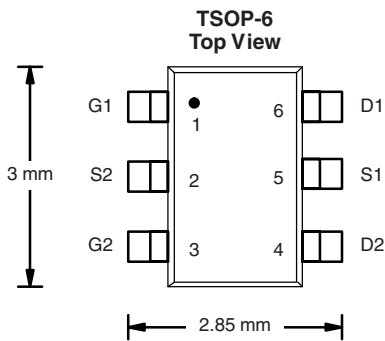
### FEATURES

- Halogen free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- Symmetrical Dual P-Channel
- Compliant to RoHS Directive 2002/95/EC



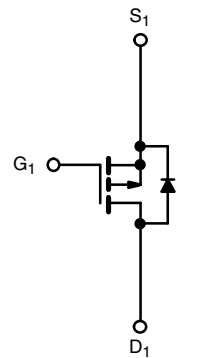
### APPLICATIONS

- Battery Switch for Portable Devices
- Computers
  - Bus Switch
  - Load Switch

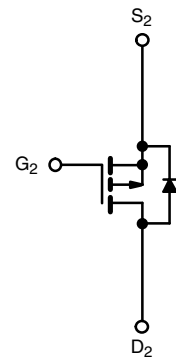


**Ordering Information:** Si3983DV-T1-E3 (Lead (Pb)-free)  
Si3983DV-T1-GE3 (Lead (Pb)-free and Halogen free)

**Marking Code:** MDxxx



P-Channel MOSFET



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T <sub>A</sub> = 25 °C, unless otherwise noted				
Parameter	Symbol	5 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	- 2.5	- 2.1
		T <sub>A</sub> = 70 °C	- 2.0	- 1.7
Pulsed Drain Current	I <sub>DM</sub>	- 8		A
Continuous Source Current (Diode Conduction) <sup>a</sup>	I <sub>S</sub>	- 1.05	- 0.75	
Maximum Power Dissipation <sup>a</sup>	P <sub>D</sub>	T <sub>A</sub> = 25 °C	1.15	0.83
		T <sub>A</sub> = 70 °C	0.73	0.53
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 ≤ 5 s	R <sub>thJA</sub>	93	110	°C/W
	Steady State		130	150	
Maximum Junction-to-Foot (Drain)	Steady State	R <sub>thJF</sub>	90	90	

Notes:

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

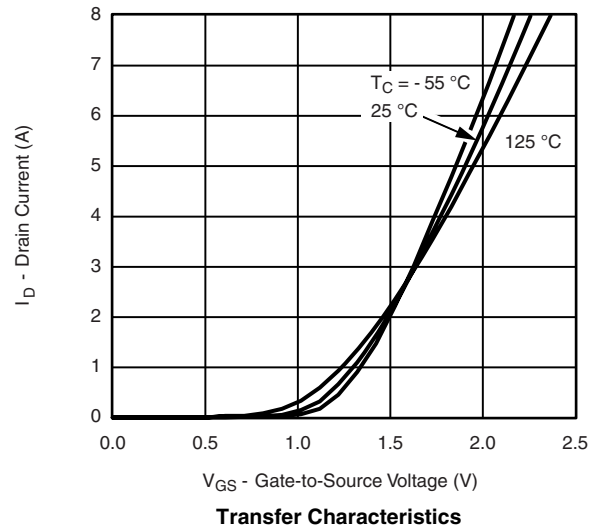
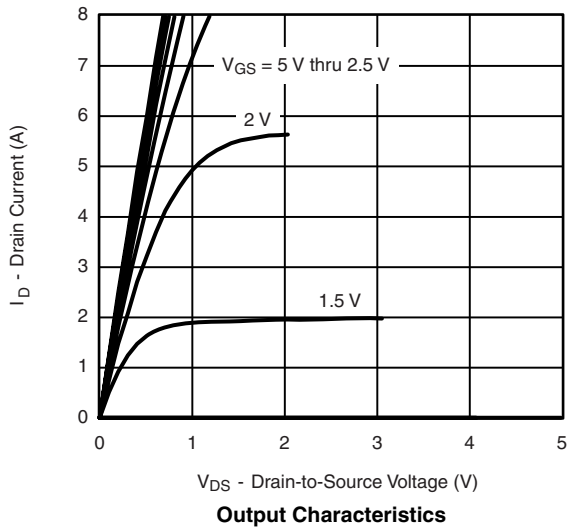
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-0.40		-1.1	V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}$			-1	$\mu\text{A}$
		$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}, T_J = 85\text{ }^\circ\text{C}$			-10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -4.5\text{ V}$	-5			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -2.5\text{ A}$		0.086	0.110	$\Omega$
		$V_{GS} = -2.5\text{ V}, I_D = -2.0\text{ A}$		0.116	0.145	
		$V_{GS} = -1.8\text{ V}, I_D = -1.0\text{ A}$		0.170	0.220	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -5\text{ V}, I_D = -2.5\text{ A}$		6		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = -1.05\text{ A}, V_{GS} = 0\text{ V}$		-0.8	-1.1	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = -10\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -2.5\text{ A}$		5	7.5	nC
Gate-Source Charge	$Q_{gs}$		0.68			
Gate-Drain Charge	$Q_{gd}$		1.30			
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\text{ V}, R_L = 10\text{ }\Omega$ $I_D \cong -1\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 6\text{ }\Omega$		28	45	ns
Rise Time	$t_r$		55	85		
Turn-Off Delay Time	$t_{d(off)}$		55	85		
Fall Time	$t_f$		32	50		
Source-Drain Reverse Recovery Time	$t_{rr}$	$I_F = -1.05\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		25	40	

Notes:

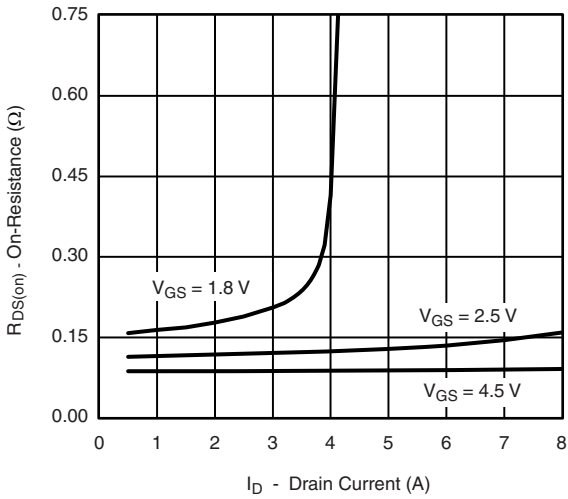
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- b. Guaranteed by design, not subject to production testing.

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.

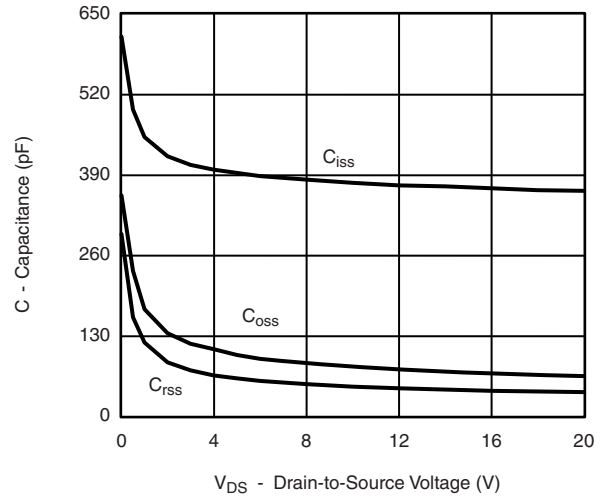
**TYPICAL CHARACTERISTICS**  $25\text{ }^\circ\text{C}$ , unless otherwise noted



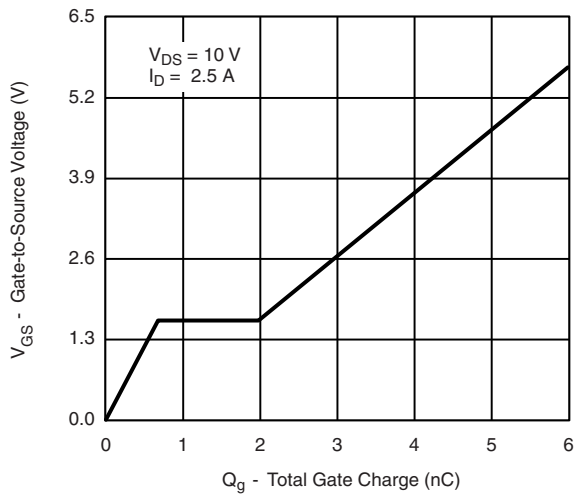
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



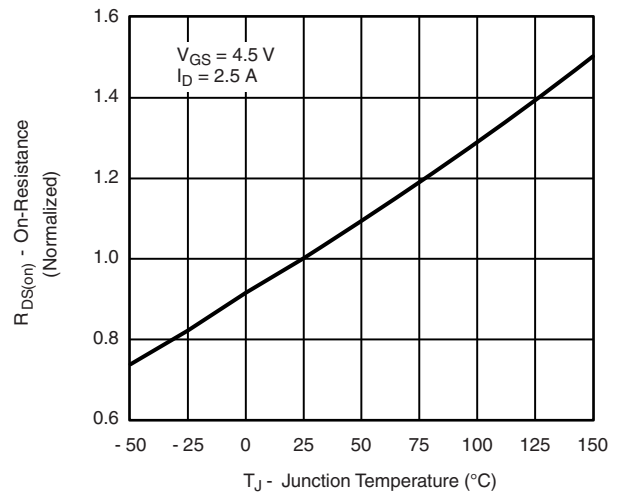
**On-Resistance vs. Drain Current**



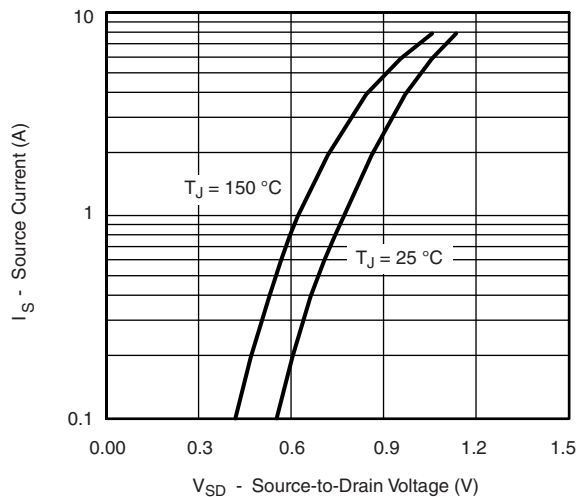
**Capacitance**



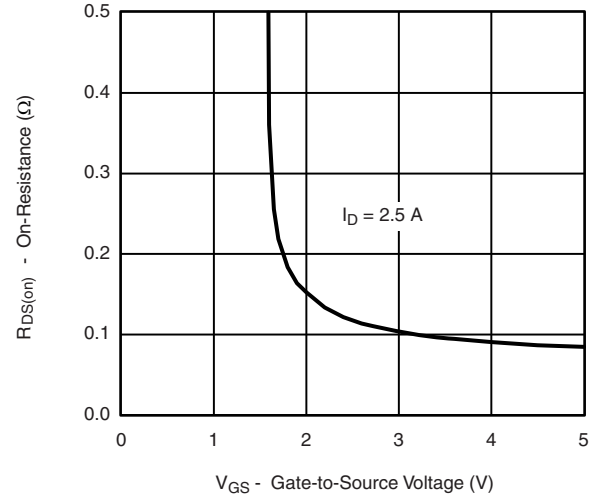
**Gate Charge**



**On-Resistance vs. Junction Temperature**

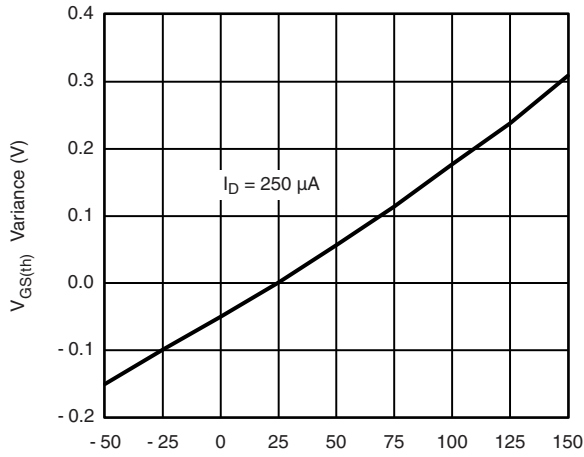


**Source-Drain Diode Forward Voltage**

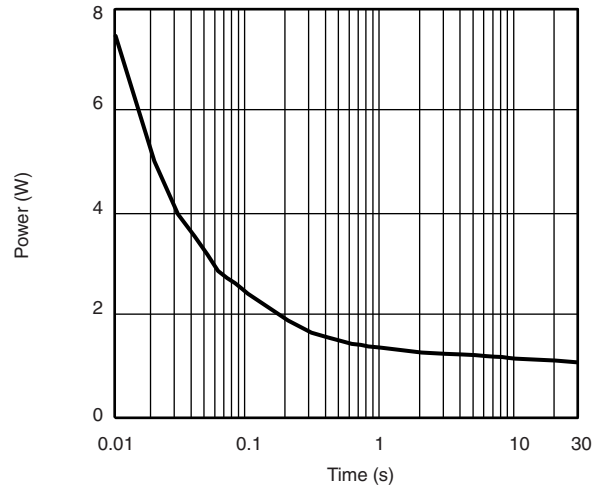


**On-Resistance vs. Gate-to-Source Voltage**

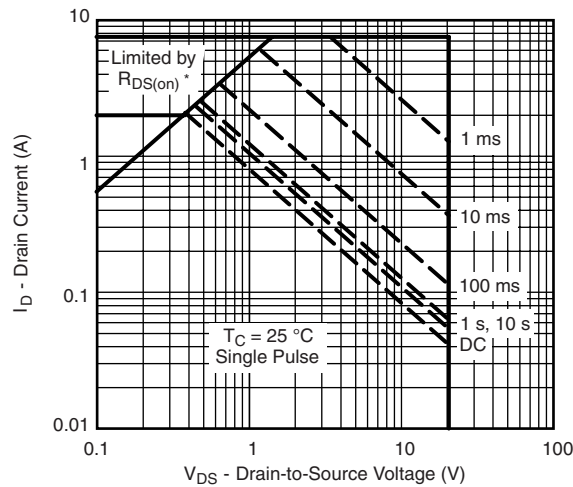
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



T<sub>J</sub> - Temperature (°C)  
**Threshold Voltage**

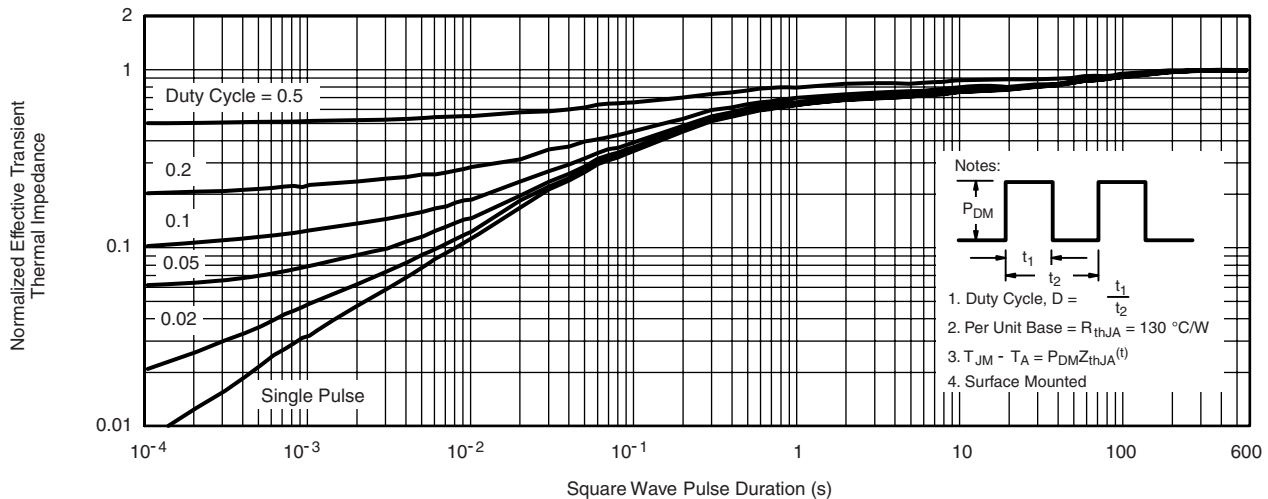


**Single Pulse Power, Junction-to-Ambient**



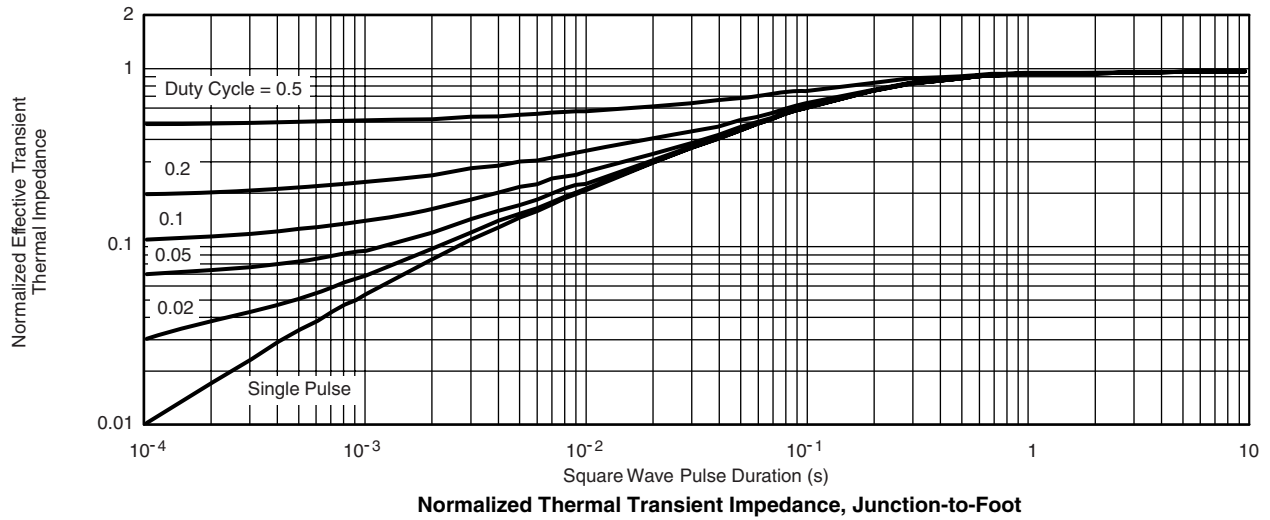
\* V<sub>GS</sub> > minimum V<sub>GS</sub> at which R<sub>DS(on)</sub> is specified

**Safe Operating Area, Junction-to-Case**



**Normalized Thermal Transient Impedance, Junction-to-Ambient**

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



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