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

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
- 20	0.032 at V_{GS} = - 4.5 V	- 7.1	16.5
	0.040 at V_{GS} = - 2.5 V	- 6.4	
	0.053 at V_{GS} = - 1.8 V	- 5.5	

FEATURES

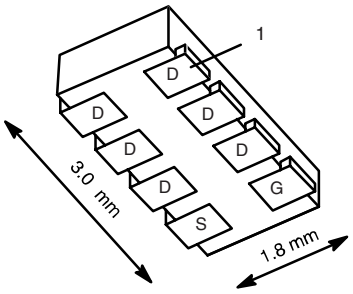
- **Halogen-free According to IEC 61249-2-21 Available**
- TrenchFET® Power MOSFET
- Ultra-Low On-Resistance
- Thermally Enhanced ChipFET® Package
- 40 % Smaller Footprint than TSOP-6

Pb-free
RoHS COMPLIANT
HALOGEN FREE Available

APPLICATIONS

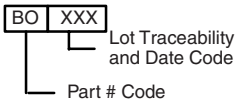
- Load Switch, PA Switch, and Battery Switch for Portable Devices

1206-8 ChipFET®

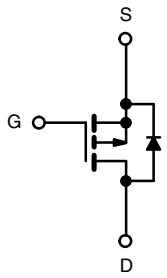


Bottom View

Marking Code



Ordering Information: Si5401DC-T1-E3 (Lead (Pb)-free)
Si5401DC-T1-GE3 (Lead (Pb)-free and Halogen-free)



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T_A = 25 °C, unless otherwise noted					
Parameter		**Symbol**	**5 s**	**Steady State**	**Unit**
Drain-Source Voltage		V_{DS}	- 20		V
Gate-Source Voltage		V_{GS}	± 8		
Continuous Drain Current (T_J = 150 °C)[a]	T_A = 25 °C	I_D	- 7.1	- 5.2	A
	T_A = 85 °C		- 5.1	- 3.7	
Pulsed Drain Current		I_{DM}	- 20		
Continuous Source Current[a]		I_S	- 2.1	- 1.1	
Maximum Power Dissipation[a]	T_A = 25 °C	P_D	2.5	1.3	W
	T_A = 85 °C		1.3	0.7	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150		°C
Soldering Recommendations (Peak Temperature)[b, c]			260		

THERMAL RESISTANCE RATINGS					
Parameter		**Symbol**	**Typical**	**Maximum**	**Unit**
Maximum Junction-to-Ambient[a]	t ≤ 5 s	R_{thJA}	40	50	°C/W
	Steady State		80	95	
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	15	20	

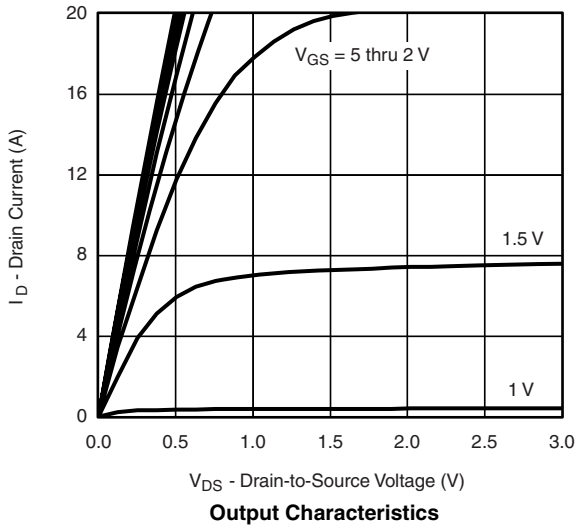
Notes:
a. Surface Mounted on 1" x 1" FR4 board.
b. See Reliability Manual for profile. The ChipFET is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.
c. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

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	- 0.40		- 1.0	V
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 8 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = - 20 V, V_{GS} = 0 V			- 1	µA
		V_{DS} = - 20 V, V_{GS} = 0 V, T_J = 85 °C			- 5	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \leq$ - 5 V, V_{GS} = - 4.5 V	- 20			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = - 4.5 V, I_D = - 5.2 A		0.026	0.032	Ω
		V_{GS} = - 2.5 V, I_D = - 4.6 A		0.033	0.040	
		V_{GS} = - 1.8 V, I_D = - 1.9 A		0.044	0.053	
Forward Transconductance[a]	g_{fs}	V_{DS} = - 10 V, I_D = - 5.2 A		20		S
Diode Forward Voltage[a]	V_{SD}	I_S = - 1.1 A, V_{GS} = 0 V		- 0.8	- 1.2	V
Dynamic[b]						
Total Gate Charge	Q_g	V_{DS} = - 10 V, V_{GS} = - 4.5 V, I_D = - 5.2 A		16.5	25	nC
Gate-Source Charge	Q_{gs}			1.7		
Gate-Drain Charge	Q_{gd}			3.5		
Gate Resistance	R_g	f = 1 MHz		9		Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 10 V, R_L = 10 Ω $I_D \cong$ - 1 A, V_{GEN} = - 4.5 V, R_g = 6 Ω		10	15	ns
Rise Time	t_r			25	40	
Turn-Off Delay Time	$t_{d(off)}$			115	175	
Fall Time	t_f			70	105	
Source-Drain Reverse Recovery Time	t_{rr}	I_F = - 1.1 A, dI/dt = 100 A/µs		30	60	
Reverse Recovery Charge	Q_{rr}			140		nC

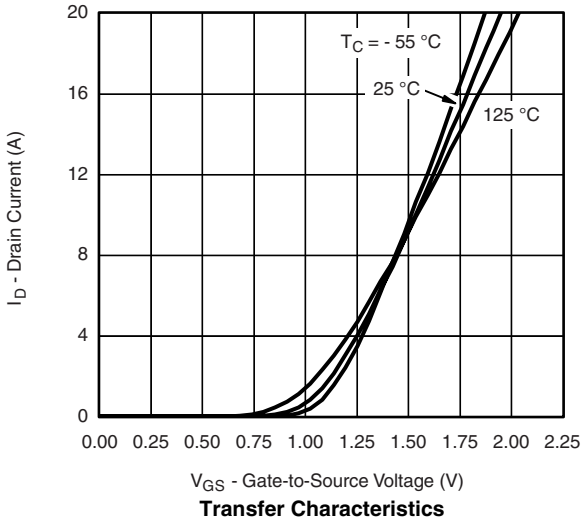
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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

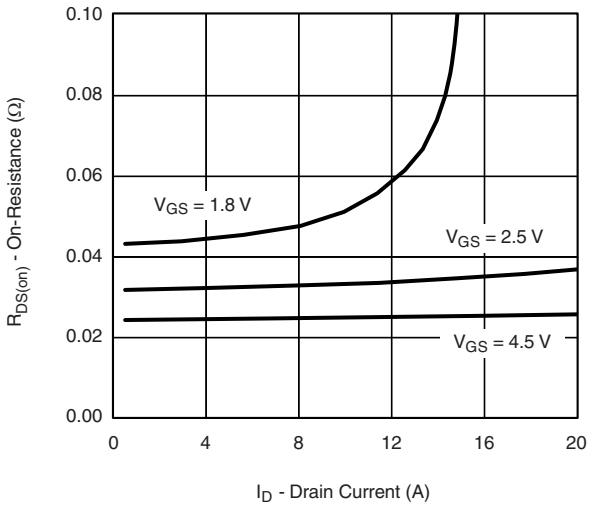


Output Characteristics

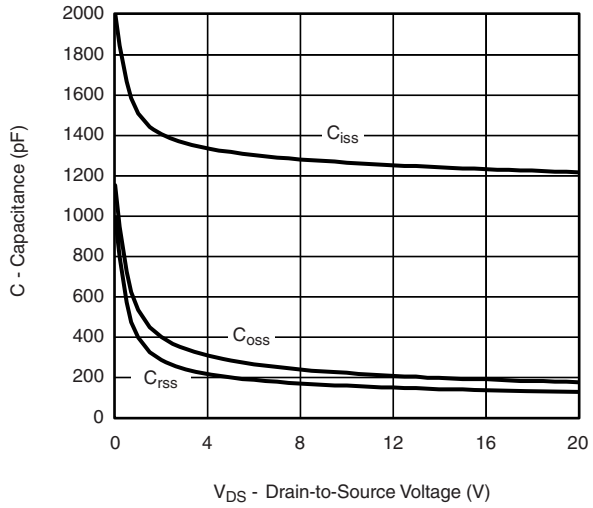


Transfer Characteristics

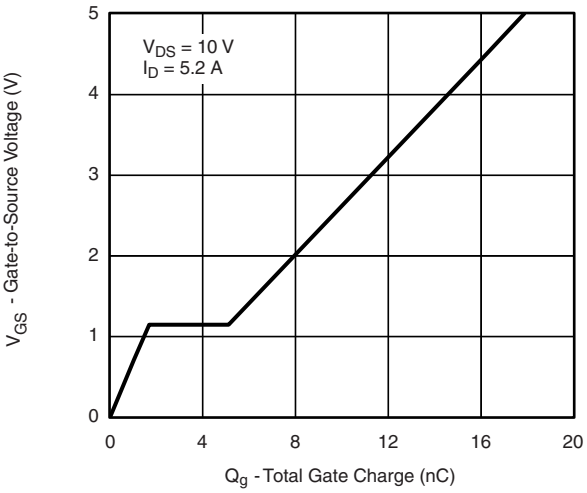
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



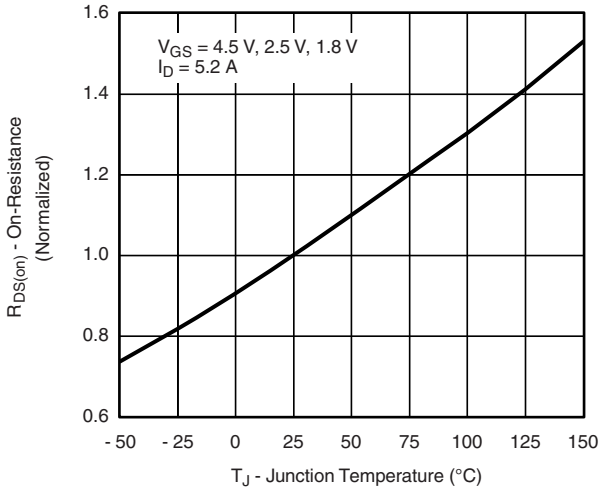
On-Resistance vs. Drain Current



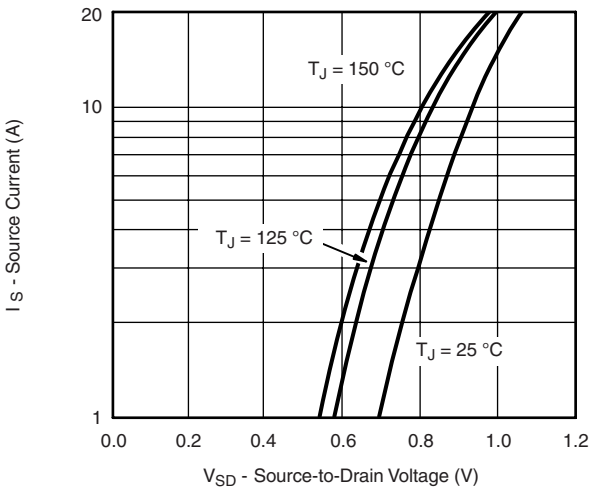
Capacitance



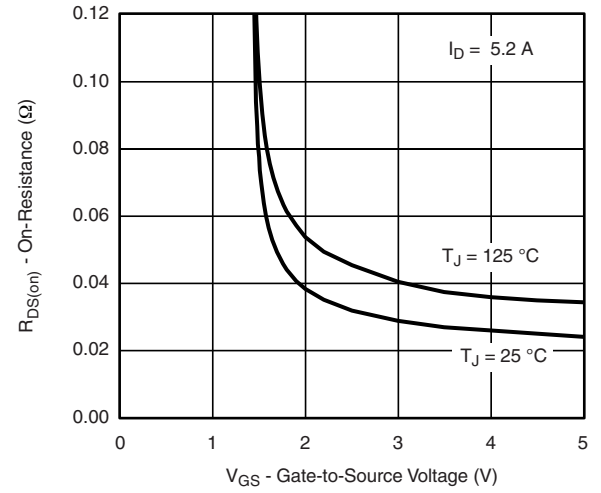
Gate Charge



On-Resistance vs. Junction Temperature

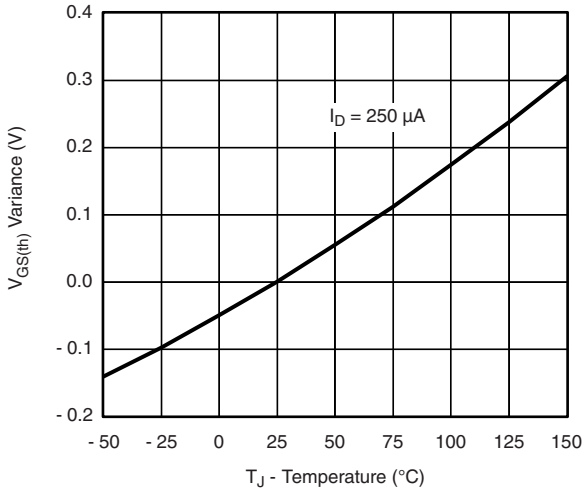


Source-Drain Diode Forward Voltage

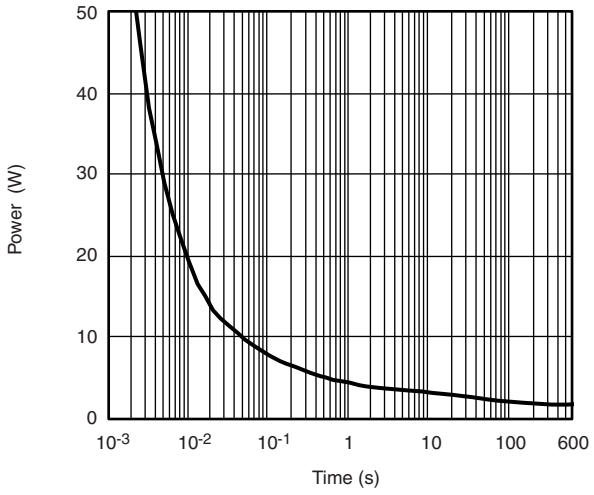


On-Resistance vs. Gate-to-Source Voltage

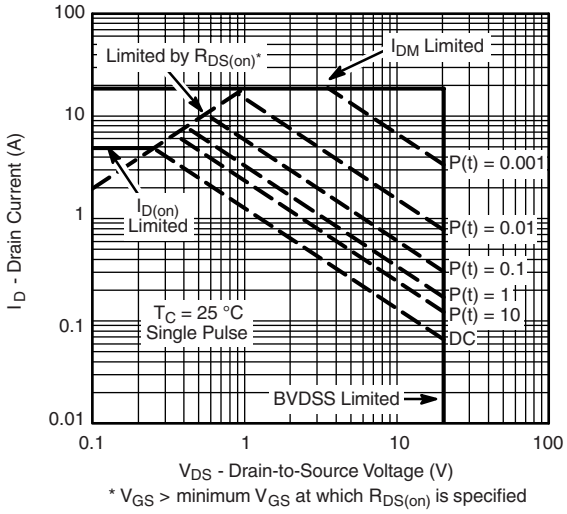
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



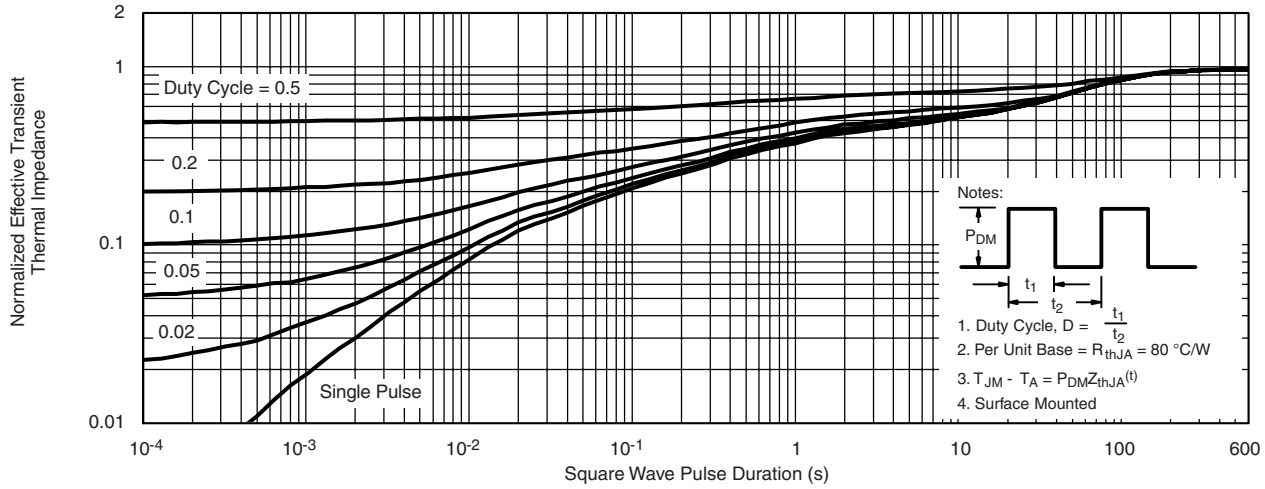
Threshold Voltage



Single Pulse Power

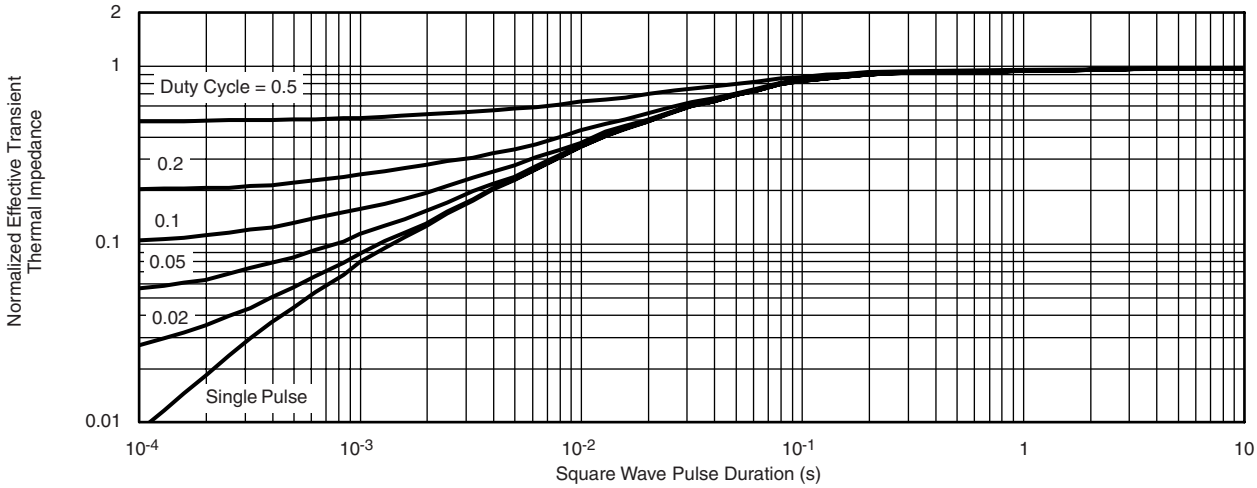


Safe Operating Area



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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