

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

PRODUCT SUMMARY

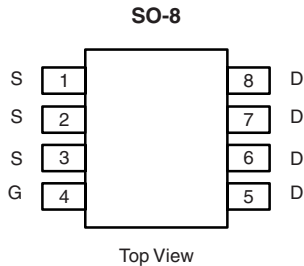
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
- 20	0.025 at $V_{GS} = - 4.5$ V	- 7.1
	0.033 at $V_{GS} = - 2.5$ V	- 6.1

FEATURES

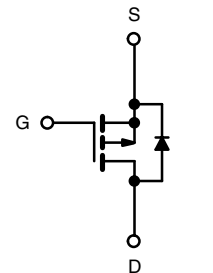
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE
Available



Ordering Information: Si9424BDY-T1-E3 (Lead (Pb)-free)
Si9424BDY-T1-GE3 (Lead (Pb)-free and Halogen-free)



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$, unless otherwise noted

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Parameter		Symbol	10 s	Steady State	Unit
Drain-Source Voltage		V_{DS}	- 20		V
Gate-Source Voltage		V_{GS}	± 9		
Continuous Drain Current ($T_J = 150\text{ }^{\circ}\text{C}$) ^a	$T_A = 25\text{ }^{\circ}\text{C}$	I_D	- 7.1	- 5.6	A
	$T_A = 70\text{ }^{\circ}\text{C}$		- 5.6	- 4.5	
Pulsed Drain Current		I_{DM}	- 30		
Continuous Source Current (Diode Conduction) ^a		I_S	- 1.7	- 1.0	
Maximum Power Dissipation ^a	$T_A = 25\text{ }^{\circ}\text{C}$	P_D	2.0	1.25	W
	$T_A = 70\text{ }^{\circ}\text{C}$		1.3	0.8	
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	R_{thJA}	50	62.5	$^\circ\text{C/W}$
		80	100	
Maximum Junction-to-Foot (Drain)	R_{thJF}	30	40	

Notes:

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

SPECIFICATIONS $T_J = 25^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -250\ \mu\text{A}$	-0.45		-0.85	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\ \text{V}$, $V_{GS} = \pm 9\ \text{V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -20\ \text{V}$, $V_{GS} = 0\ \text{V}$			-1	μA
		$V_{DS} = -20\ \text{V}$, $V_{GS} = 0\ \text{V}$, $T_J = 55^\circ\text{C}$			-5	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \leq -5\ \text{V}$, $V_{GS} = -4.5\ \text{V}$	-30			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -4.5\ \text{V}$, $I_D = -7.1\ \text{A}$		0.014	0.025	Ω
		$V_{GS} = -2.5\ \text{V}$, $I_D = -6.6\ \text{A}$		0.019	0.033	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -10\ \text{V}$, $I_D = -7.7\ \text{A}$		25		S
Diode Forward Voltage ^a	V_{SD}	$I_S = -2.3\ \text{A}$, $V_{GS} = 0\ \text{V}$		-0.7	-1.2	V
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = -6\ \text{V}$, $V_{GS} = -4.5\ \text{V}$, $I_D = -7.1\ \text{A}$		24	40	nC
Gate-Source Charge	Q_{gs}			3.5		
Gate-Drain Charge	Q_{gd}			5.8		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -6\ \text{V}$, $R_L = 6\ \Omega$ $I_D \equiv -1\ \text{A}$, $V_{GEN} = -4.5\ \text{V}$, $R_g = 6\ \Omega$		30	45	ns
Rise Time	t_r			40	60	
Turn-Off Delay Time	$t_{d(off)}$			130	200	
Fall Time	t_f			70	105	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = -2.3\ \text{A}$, $di/dt = 100\ \text{A}/\mu\text{s}$		50	100	

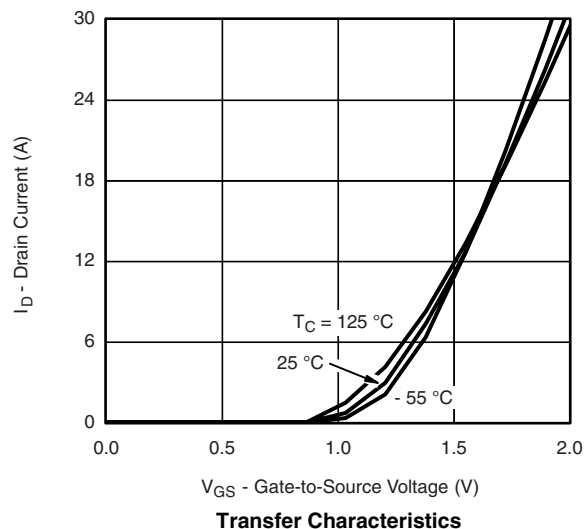
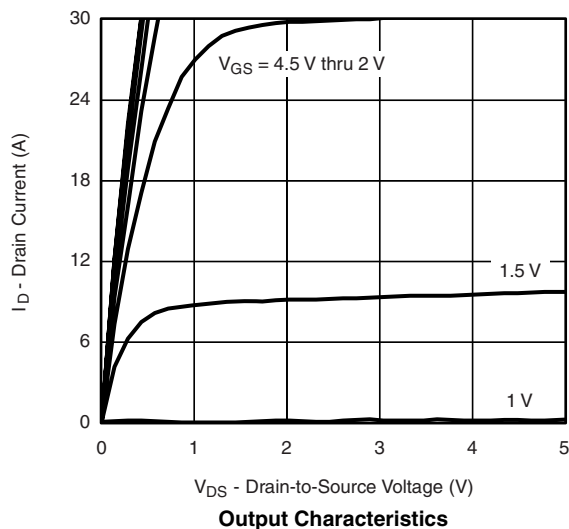
Notes:

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

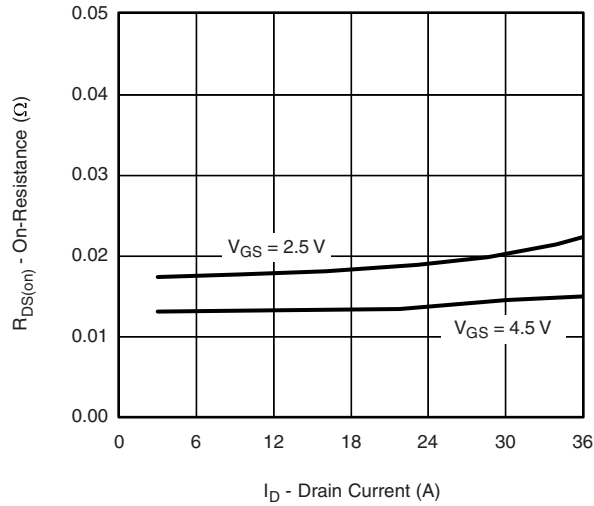
b. Guaranteed by design, not subject to production testing.

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.

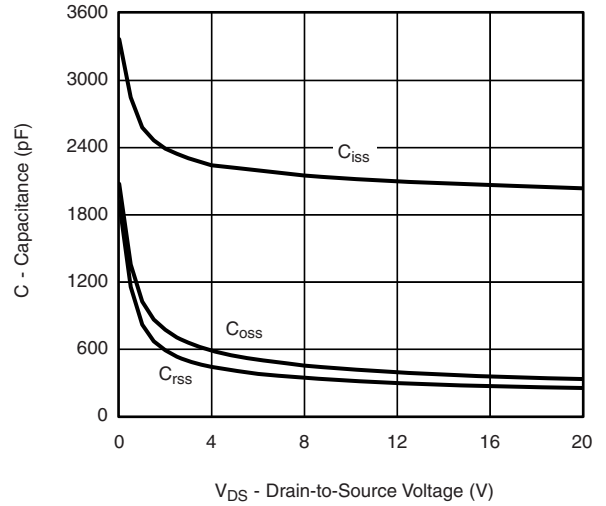
TYPICAL CHARACTERISTICS 25°C , unless otherwise noted



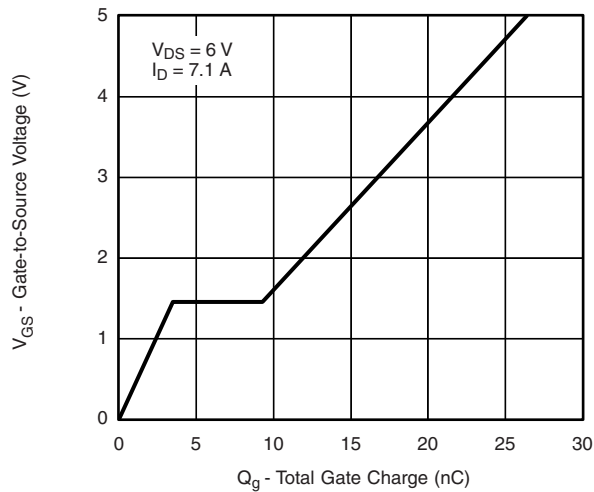
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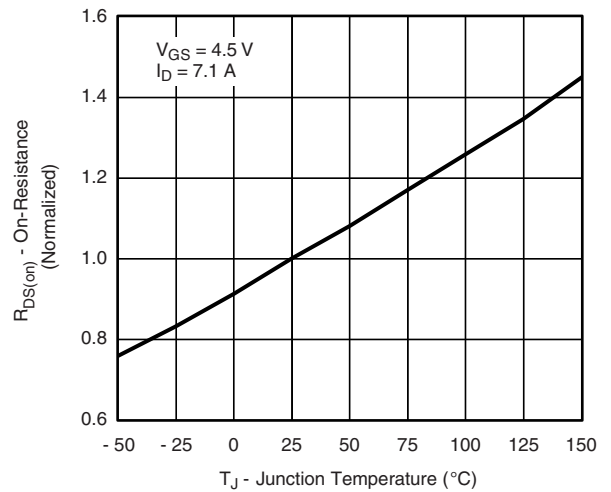
On-Resistance vs. Drain Current



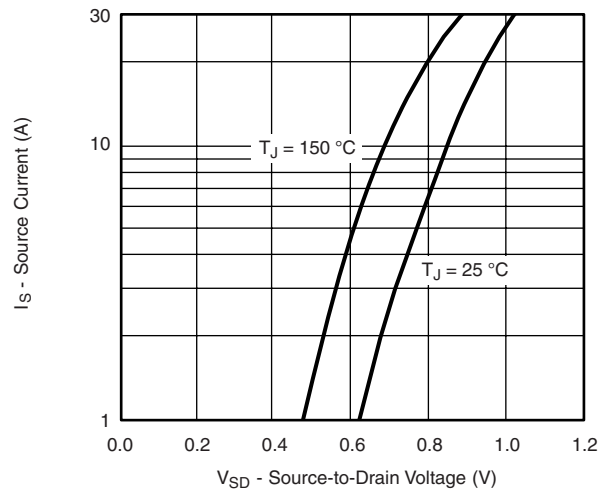
Capacitance



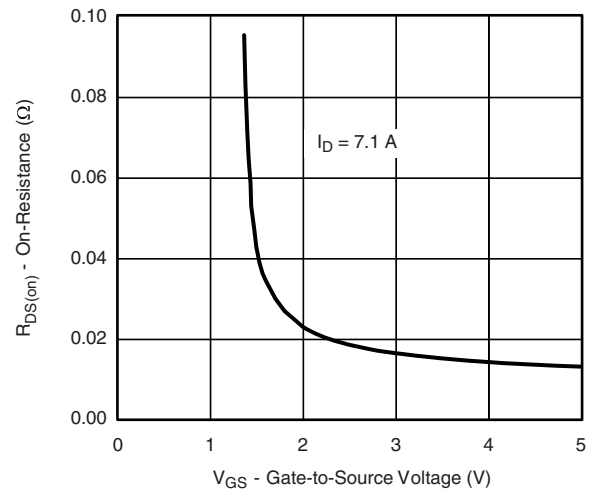
Gate Charge



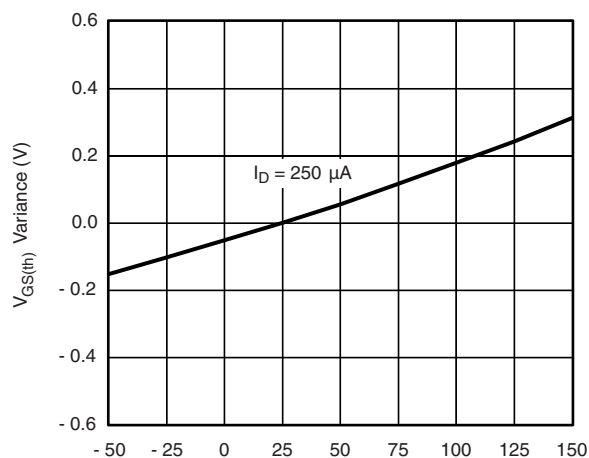
On-Resistance vs. Junction Temperature



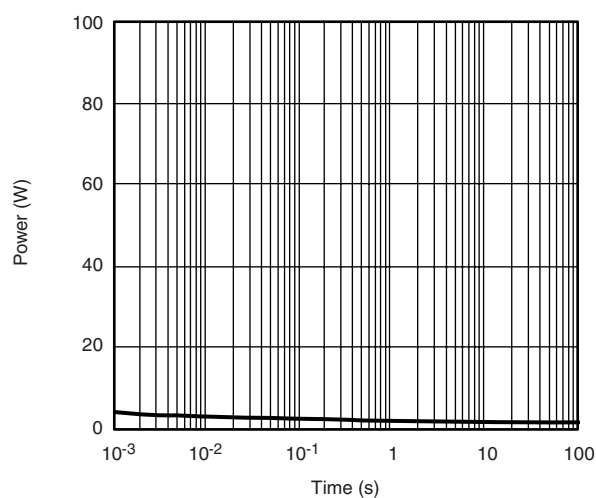
Source-Drain Diode Forward Voltage



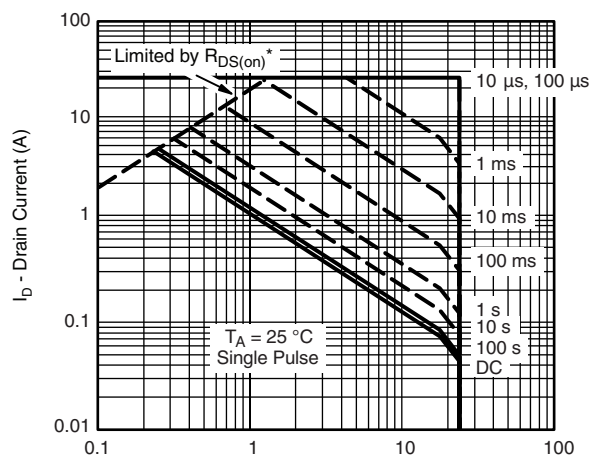
On-Resistance vs. Gate-to-Source Voltage

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Threshold Voltage

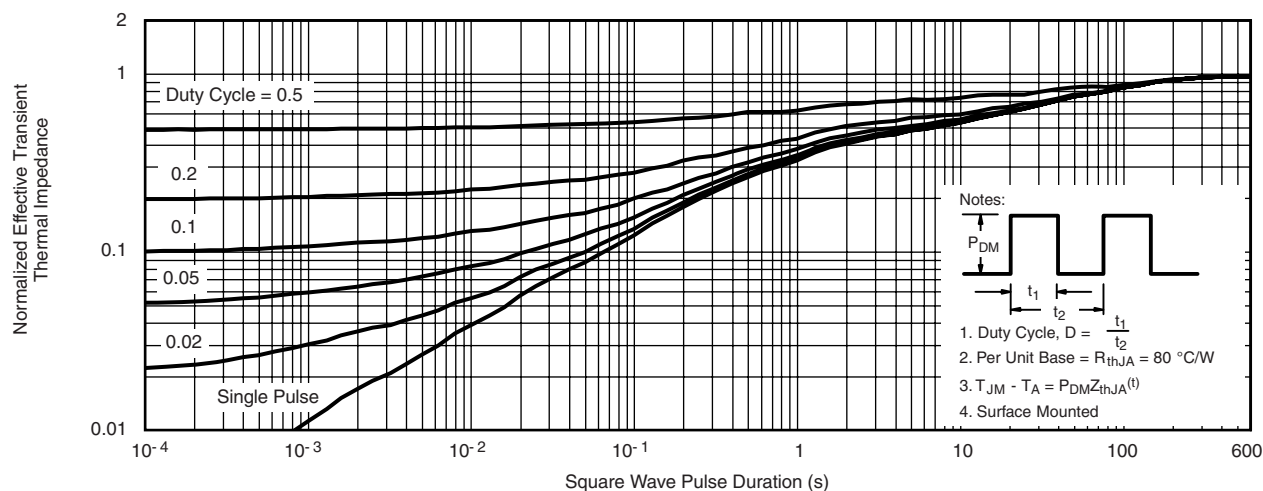


Single Pulse Power



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

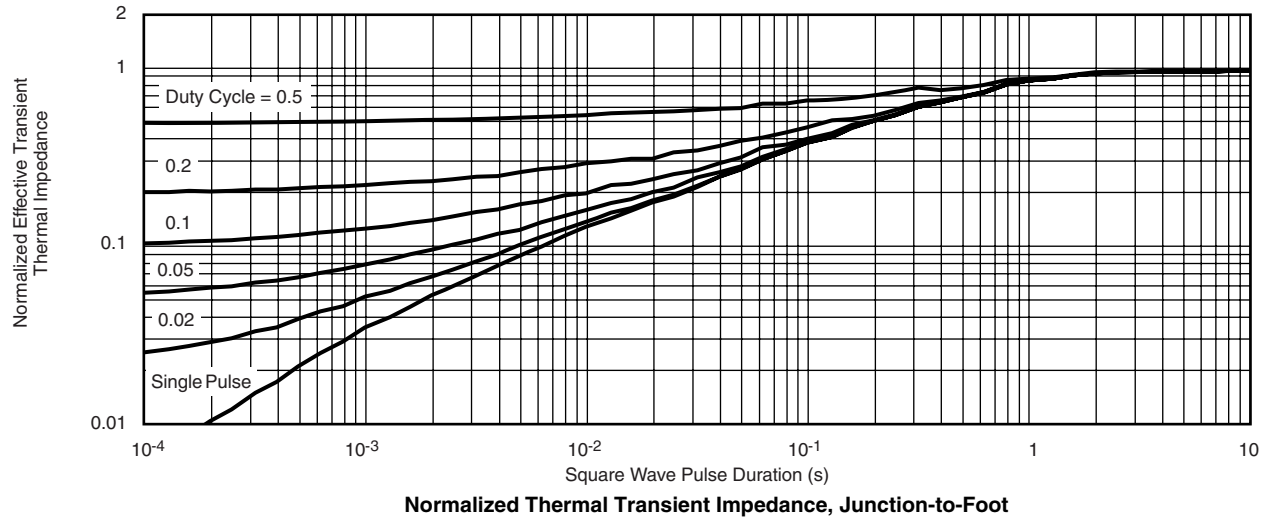
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



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