

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

PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
- 20	0.00875 at $V_{GS} = - 4.5$ V	- 14
	0.01075 at $V_{GS} = - 2.5$ V	- 12
	0.0135 at $V_{GS} = - 1.8$ V	- 11

FEATURES

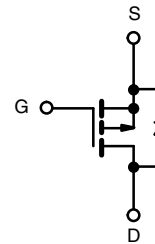
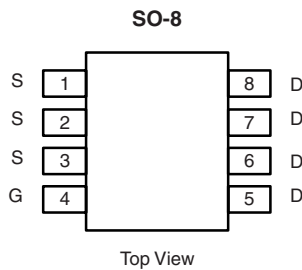
- Halogen-free Option Available
- TrenchFET[®] Power MOSFET



RoHS
COMPLIANT

APPLICATIONS

- Game Station
- Load Switch



P-Channel MOSFET

Ordering Information: Si4421DY-T1-E3 (Lead (Pb)-free)
Si4421DY-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted					
Parameter	Symbol	10 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	I_D	$T_A = 25$ °C	- 14	- 10	A
		$T_A = 70$ °C	- 11.5	- 8	
Pulsed Drain Current	I_{DM}	- 40		A	
Continuous Source Current (Diode Conduction) ^a	I_S	- 2.7	- 1.36		
Maximum Power Dissipation ^a	P_D	$T_A = 25$ °C	3.0	1.5	W
		$T_A = 70$ °C	1.9	0.95	
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	R_{thJA}	$t \leq 10$ s	33	42	°C/W
		Steady State	70	85	
Maximum Junction-to-Foot (Drain)	R_{thJF}	16	21		

Notes:

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

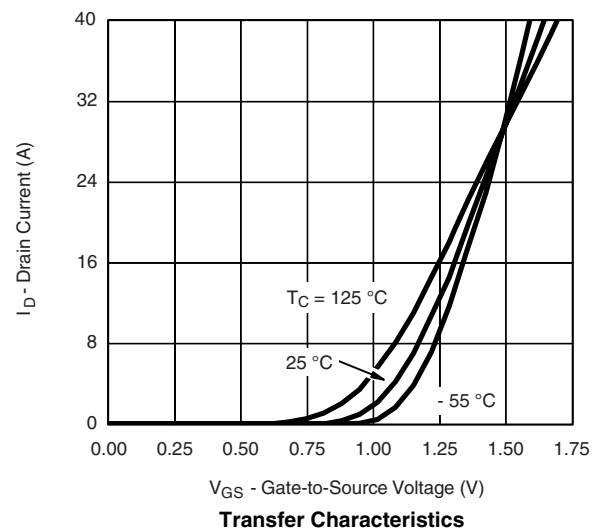
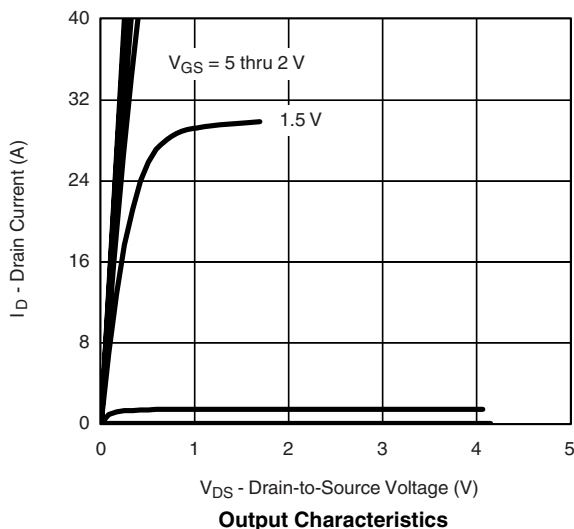
SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -850\text{ }\mu\text{A}$	-0.4		-0.8	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}$			-1	μA
		$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}, T_J = 70\text{ }^\circ\text{C}$			-10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -4.5\text{ V}$	-30			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -14\text{ A}$		0.007	0.00875	Ω
		$V_{GS} = -2.5\text{ V}, I_D = -12\text{ A}$		0.0085	0.01075	
		$V_{GS} = -1.8\text{ V}, I_D = -11\text{ A}$		0.011	0.0135	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -10\text{ V}, I_D = -14\text{ A}$		55		S
Diode Forward Voltage ^a	V_{SD}	$I_S = -2.7\text{ A}, V_{GS} = 0\text{ V}$		-0.6	-1.1	V
Dynamic^b						
Total Gate Charge	Q_g	$V_{DS} = -10\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -14\text{ A}$		82	125	nC
Gate-Source Charge	Q_{gs}		10			
Gate-Drain Charge	Q_{gd}		27			
Gate Resistance	R_g			3		Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\text{ V}, R_L = 10\text{ }\Omega$ $I_D \cong -1\text{ A}, V_{GEN} = -4.5\text{ V}, R_G = 6\text{ }\Omega$		45	70	ns
Rise Time	t_r		90	140		
Turn-Off Delay Time	$t_{d(off)}$		350	550		
Fall Time	t_f		170	260		
Source-Drain Reverse Recovery Time	t_{rr}		$I_F = -2.1\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		135	

Notes:

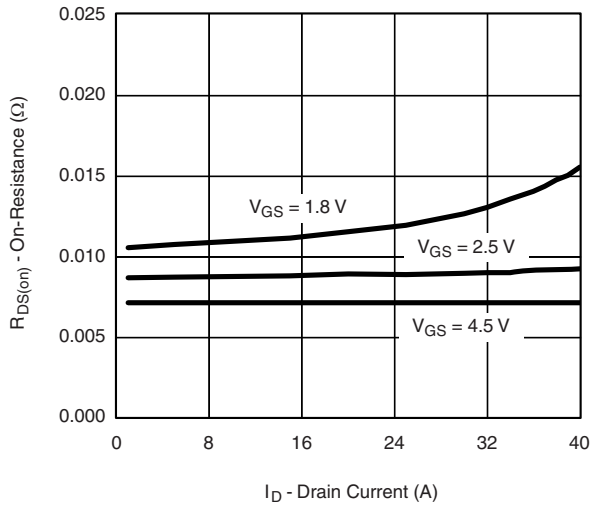
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- b. Guaranteed by design, not subject to production testing.

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.

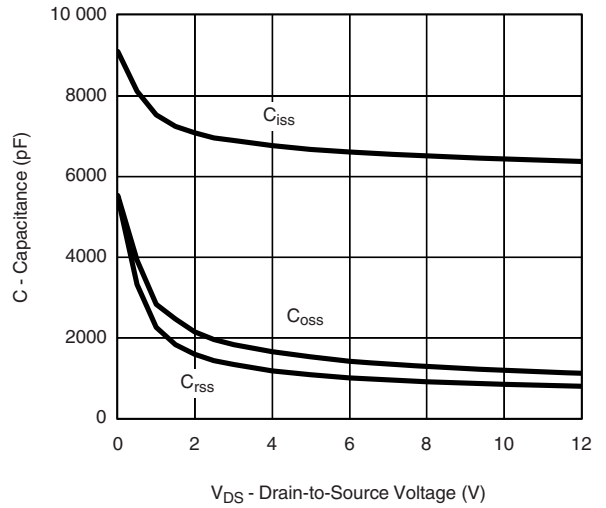
TYPICAL CHARACTERISTICS $25\text{ }^\circ\text{C}$, unless otherwise noted



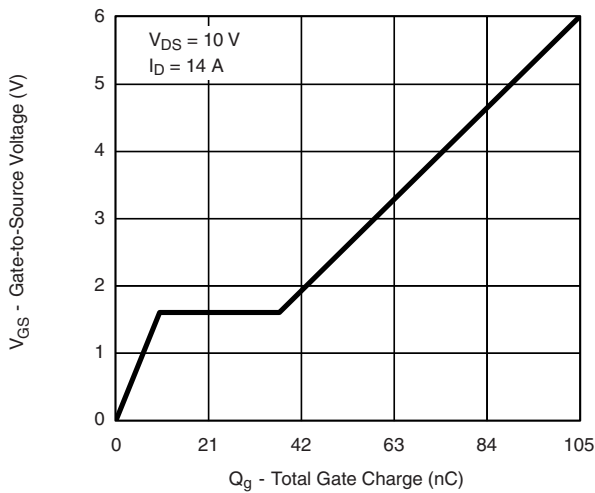
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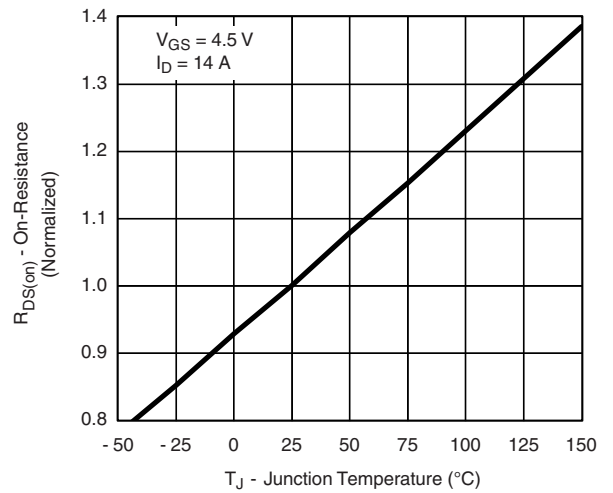
On-Resistance vs. Drain Current



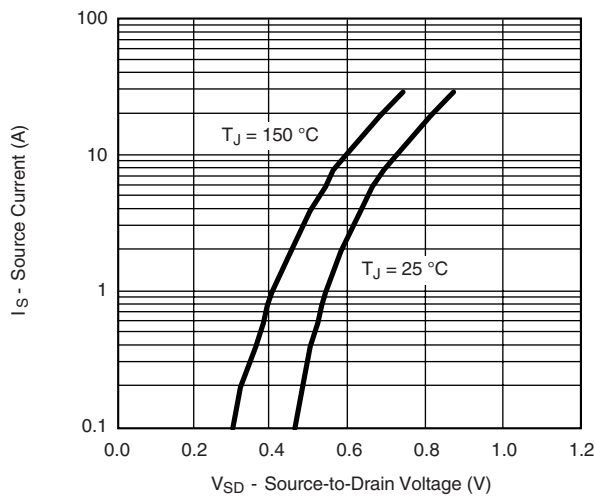
Capacitance



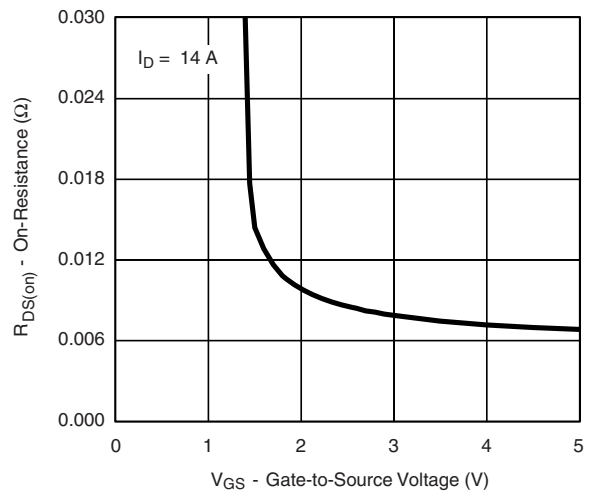
Gate Charge



On-Resistance vs. Junction Temperature

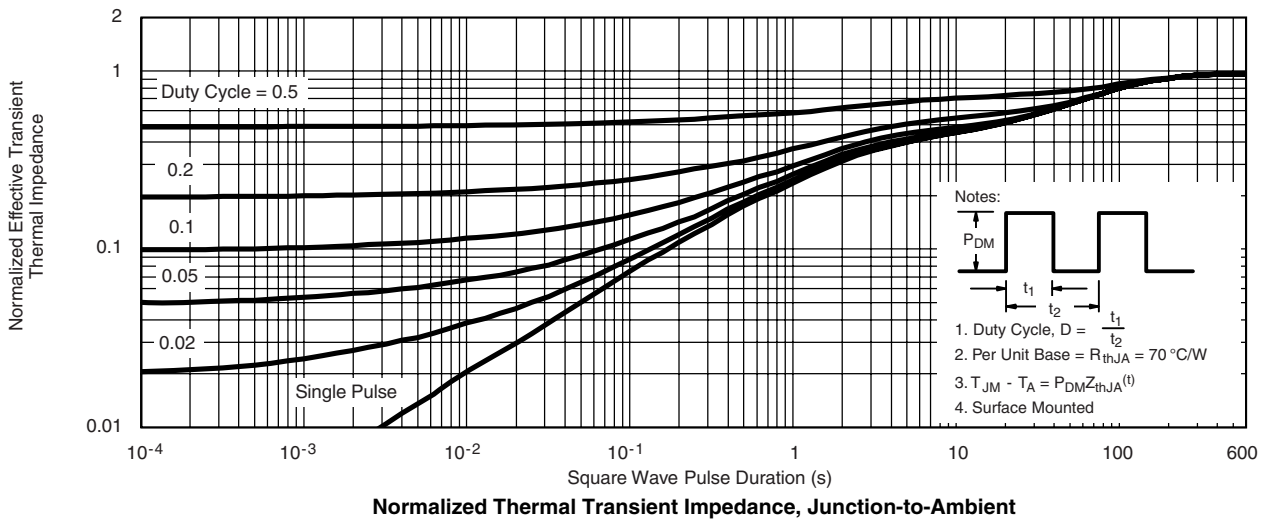
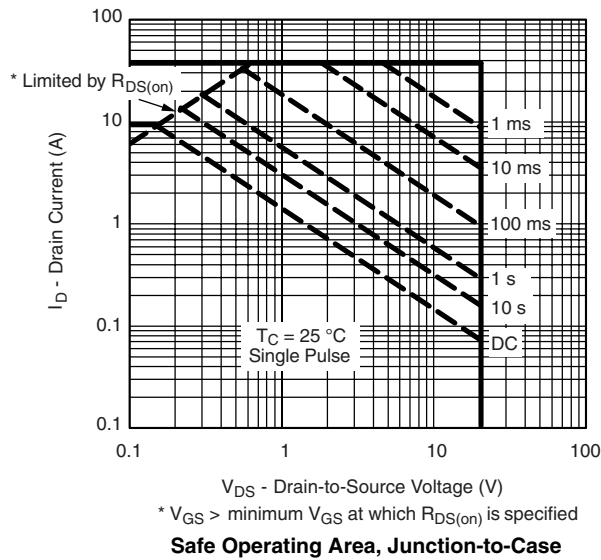
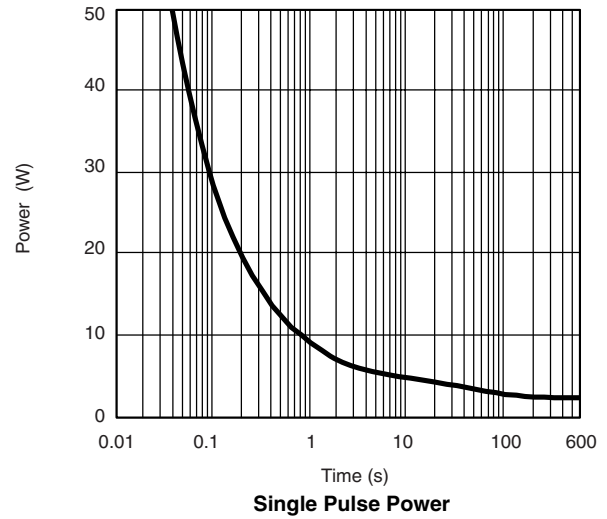
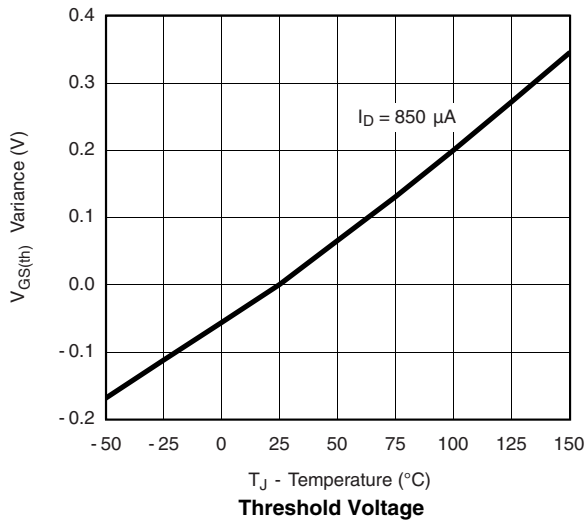


Source-Drain Diode Forward Voltage



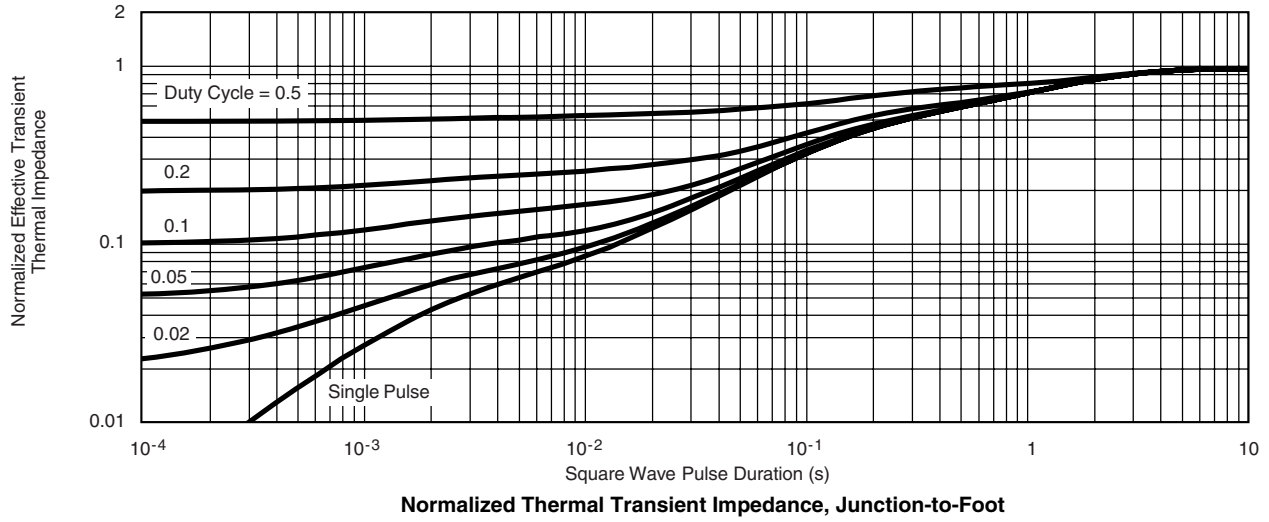
On-Resistance vs. Gate-to-Source Voltage

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted





TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



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SOIC (NARROW): 8-LEAD

JEDEC Part Number: MS-012



DIM	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A ₁	0.10	0.20	0.004	0.008
B	0.35	0.51	0.014	0.020
C	0.19	0.25	0.0075	0.010
D	4.80	5.00	0.189	0.196
E	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
H	5.80	6.20	0.228	0.244
h	0.25	0.50	0.010	0.020
L	0.50	0.93	0.020	0.037
q	0°	8°	0°	8°
S	0.44	0.64	0.018	0.026
ECN: C-06527-Rev. I, 11-Sep-06				
DWG: 5498				

RECOMMENDED MINIMUM PADS FOR SO-8



Recommended Minimum Pads
Dimensions in Inches/(mm)

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