



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

PRODUCT SUMMARY		
$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (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

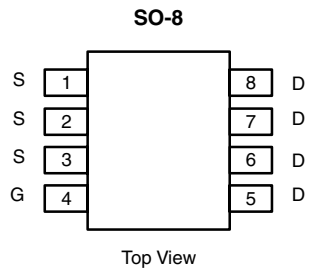
- TrenchFET<sup>®</sup> Power MOSFET

### APPLICATIONS

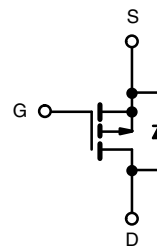
- Game Station
- Load Switch



**RoHS\***  
COMPLIANT



**Ordering Information:** Si4421DY-T1  
Si4421DY-T1-E3 (Lead (Pb)-free)



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted				
Parameter	Symbol	10 secs	Steady State	Unit
Drain-Source Voltage	$V_{DS}$	- 20		V
Gate-Source Voltage	$V_{GS}$	$\pm 8$		
Continuous Drain Current ( $T_J = 150$ °C) <sup>a</sup>	$I_D$	$T_A = 25$ °C	- 14	- 10
		$T_A = 70$ °C	- 11.5	- 8
Pulsed Drain Current	$I_{DM}$	- 40		A
Continuous Source Current (Diode Conduction) <sup>a</sup>	$I_S$	- 2.7	- 1.36	
Maximum Power Dissipation <sup>a</sup>	$P_D$	$T_A = 25$ °C	3.0	1.5
		$T_A = 70$ °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 <sup>a</sup>	$t \leq 10$ sec	$R_{thJA}$	33	42	°C/W
	Steady State		70	85	
Maximum Junction-to-Foot (Drain)	Steady State	$R_{thJF}$	16	21	

Notes:

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

\* Pb containing terminations are not RoHS compliant, exemptions may apply.



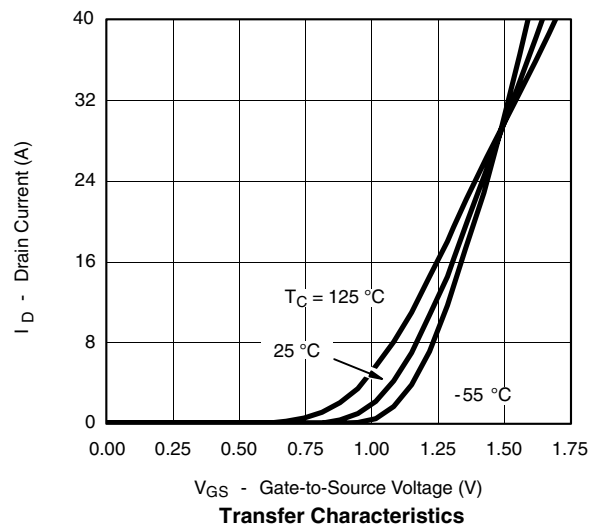
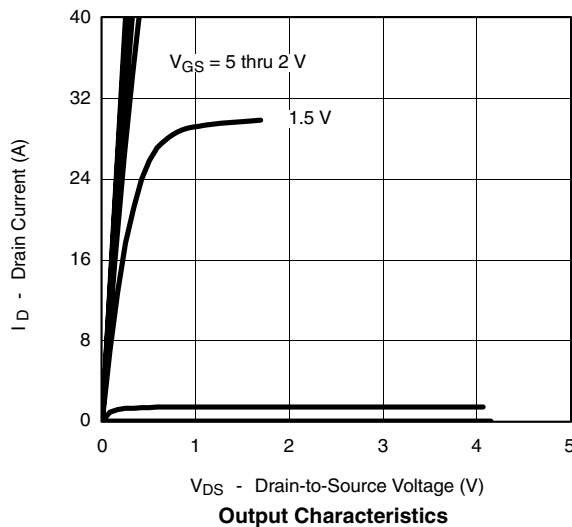
<b>SPECIFICATIONS</b> $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -850\text{ }\mu\text{A}$	-0.4		-0.8	V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}$			-1	$\mu\text{A}$
		$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}, T_J = 70\text{ }^\circ\text{C}$			-10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -4.5\text{ V}$	-30			A
Drain-Source On-State Resistance <sup>a</sup>	$r_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -14\text{ A}$		0.007	0.00875	$\Omega$
		$V_{GS} = -2.5\text{ V}, I_D = -12\text{ A}$		0.0085	0.01075	
		$V_{GS} = -1.8\text{ V}, I_D = -11\text{ A}$		0.011	0.0135	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -10\text{ V}, I_D = -14\text{ A}$		55		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = -2.7\text{ A}, V_{GS} = 0\text{ V}$		-0.6	-1.1	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = -10\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -14\text{ A}$		82	125	nC
Gate-Source Charge	$Q_{gs}$		10			
Gate-Drain Charge	$Q_{gd}$		27			
Gate Resistance	$R_g$			3		$\Omega$
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.

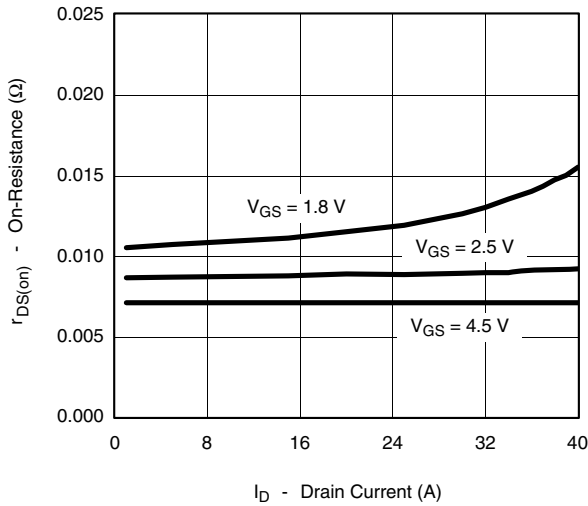
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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

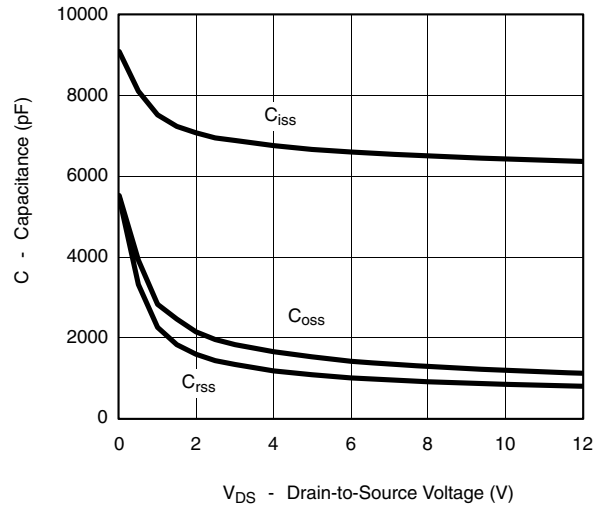




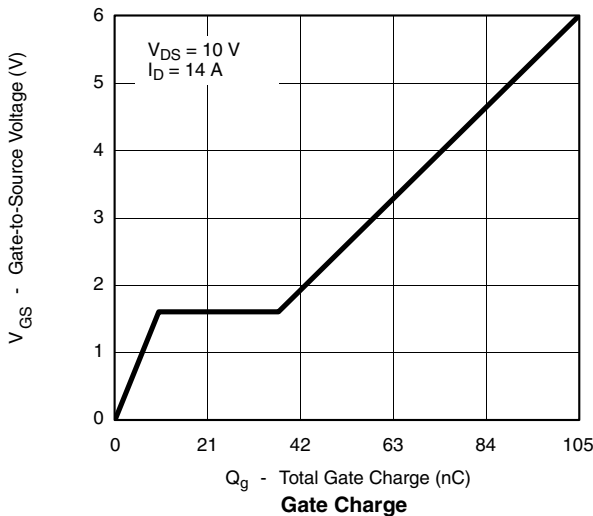
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



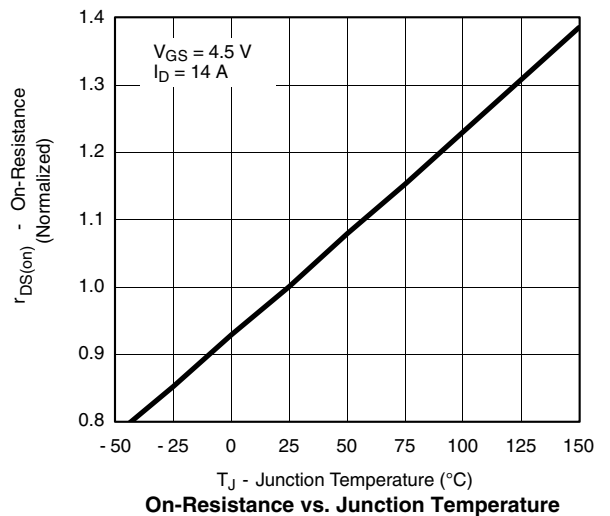
**On-Resistance vs. Drain Current**



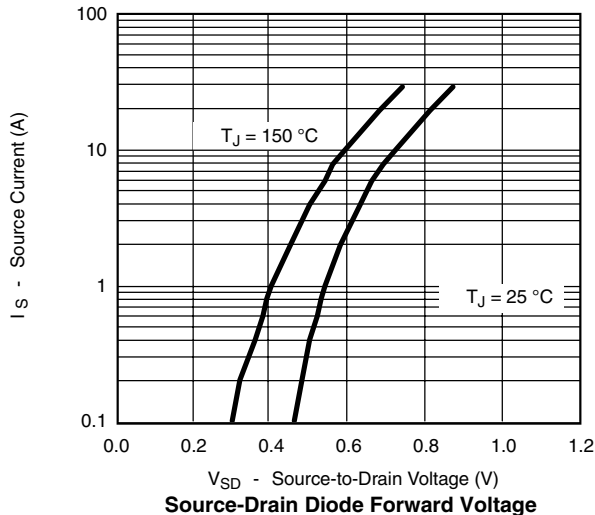
**Capacitance**



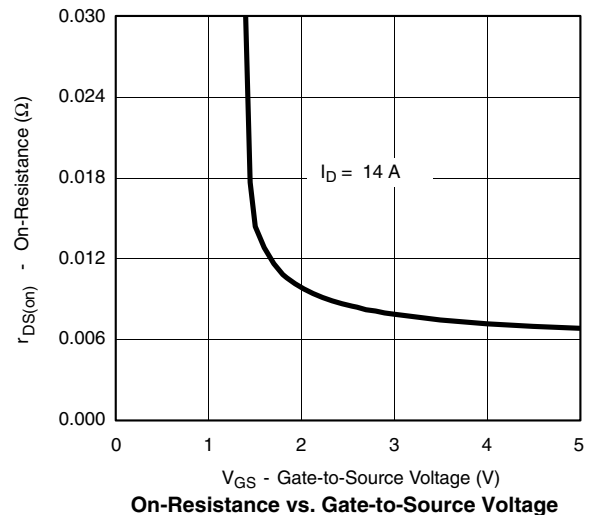
**Gate Charge**



**On-Resistance vs. Junction Temperature**



**Source-Drain Diode Forward Voltage**



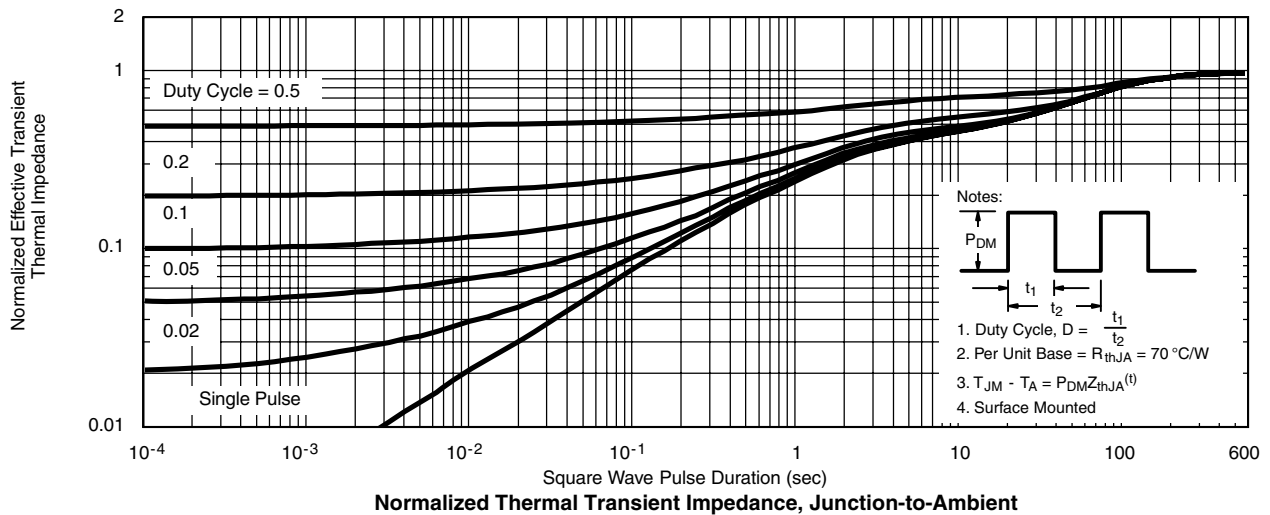
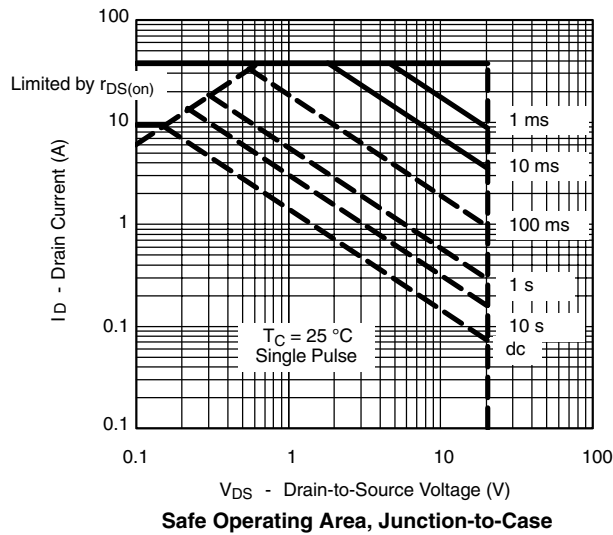
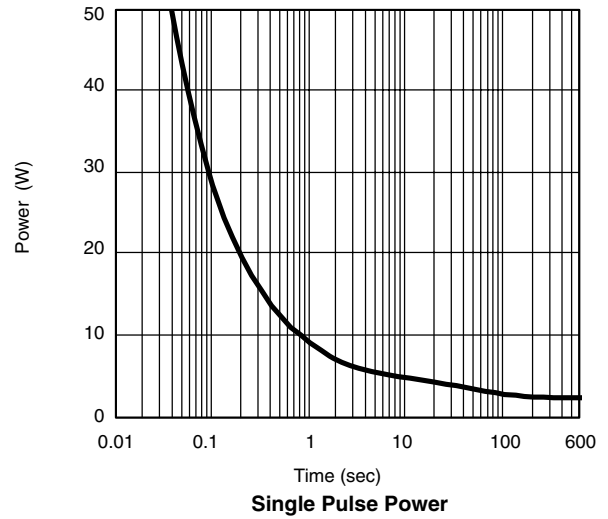
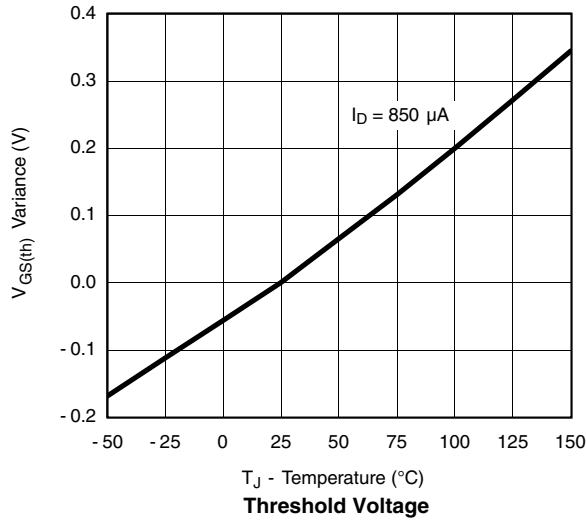
**On-Resistance vs. Gate-to-Source Voltage**

# Si4421DY

Vishay Siliconix

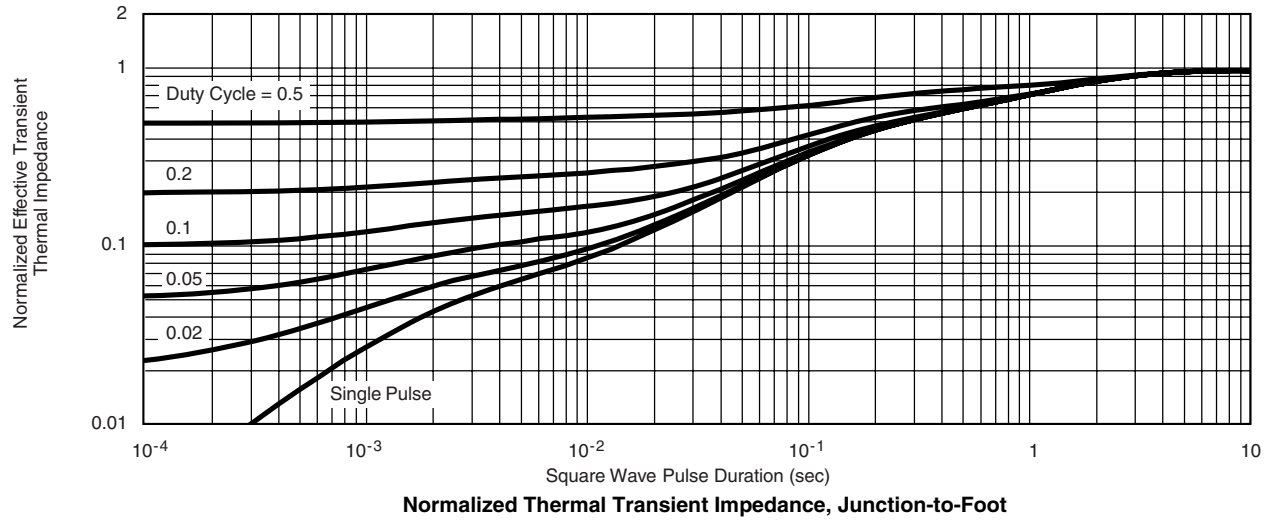


## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted





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



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