



New Product

Si4446DY
Vishay Siliconix

N-Channel 40-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ)
40	0.040 at $V_{GS} = 10$ V	5.2	8
	0.045 at $V_{GS} = 4.5$ V	4.9	

FEATURES

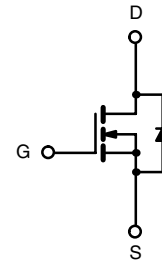
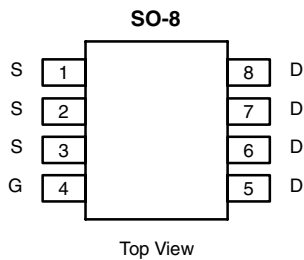
- TrenchFET® Power MOSFET
- 100 % R_g Tested
- UIS Tested

APPLICATIONS

- CCFL Inverter



RoHS
COMPLIANT



N-Channel MOSFET

Ordering Information: Si4446DY-T1-E3 (Lead (Pb)-free)

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

Parameter	Symbol	10 secs	Steady State	Unit
Drain-Source Voltage	V_{DS}	40		V
Gate-Source Voltage	V_{GS}	± 12		
Continuous Drain Current ($T_J = 150^\circ\text{C}$) ^a	I_D	5.2	3.9	A
		4.2	3.1	
Pulsed Drain Current	I_{DM}	30		
Continuous Source Current (Diode Conduction) ^a	I_S	1.7	0.9	
Avalanche Current	I_{AS}	13		mJ
Single Pulse Avalanche Energy	E_{AS}	8.5		
Maximum Power Dissipation ^a	P_D	2.0	1.1	W
		1.3	0.7	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to 150		$^\circ\text{C}$

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typ	Max	Unit
Maximum Junction-to-Ambient ^a	R_{thJA}	52	62.5	$^\circ\text{C/W}$
		90	110	
Maximum Junction-to-Foot (Drain)	R_{thJF}	32	40	

Notes

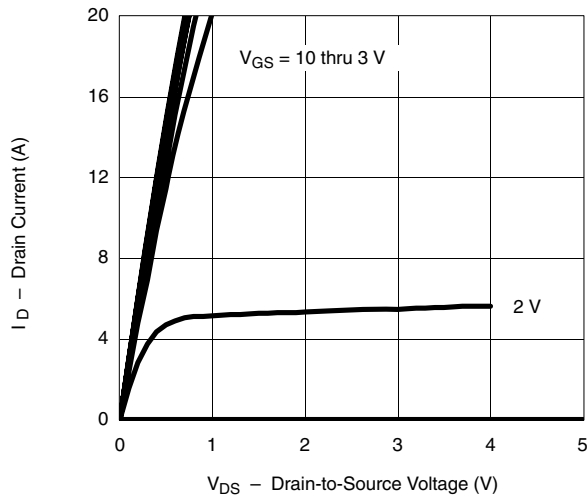
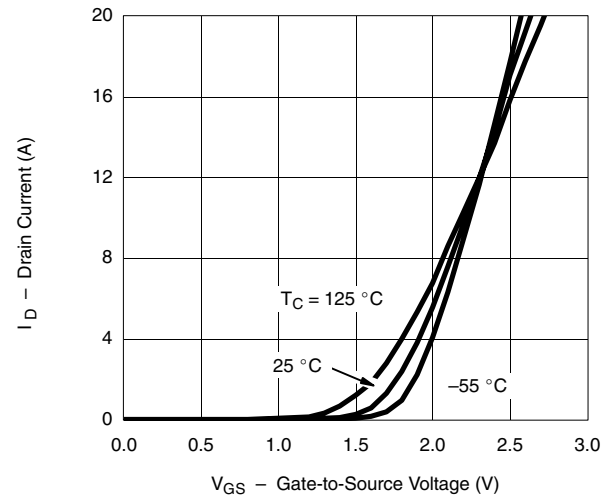
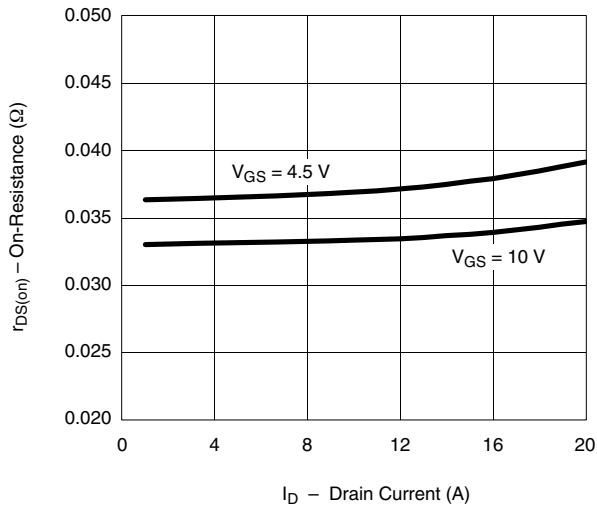
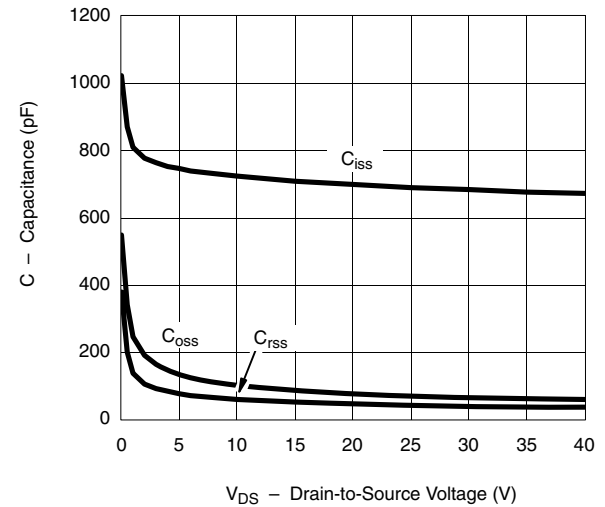
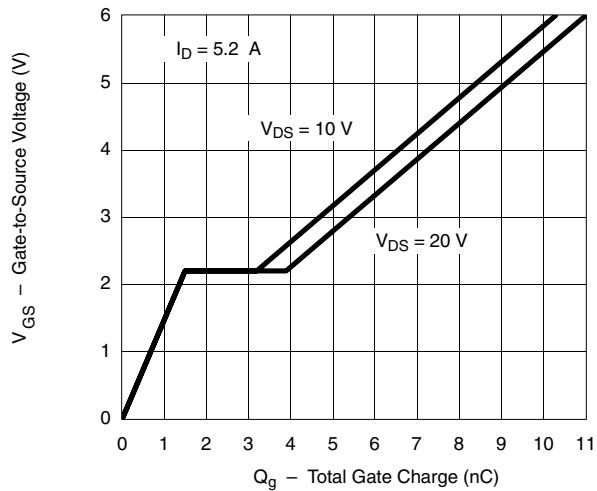
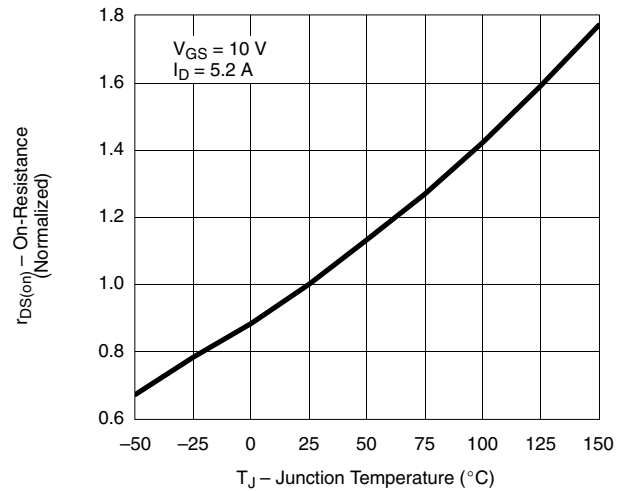
a. Surface Mounted on 1" x 1" FR4 Board.

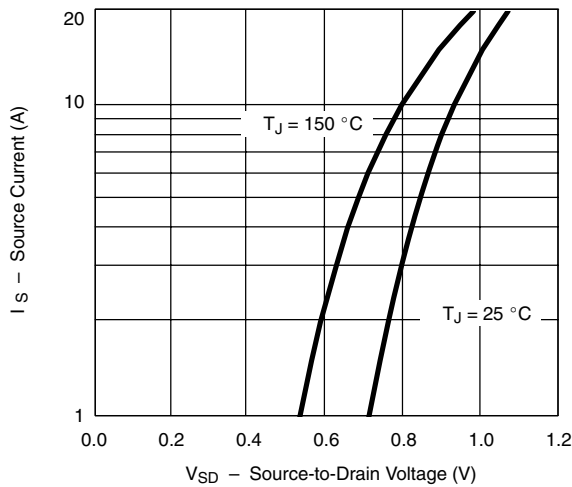
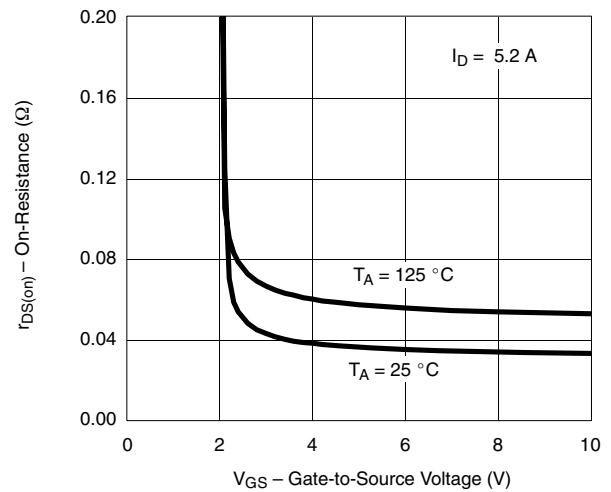
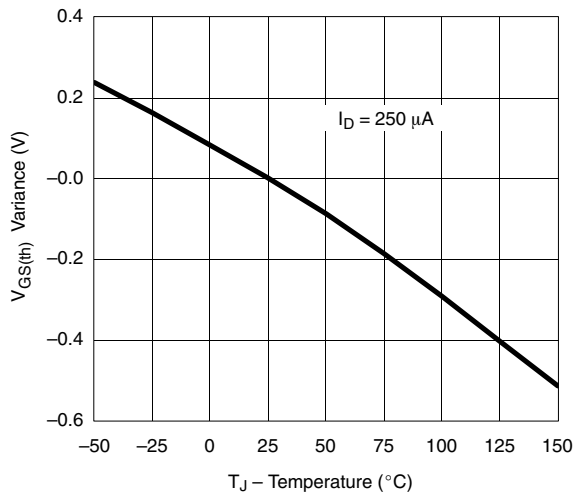
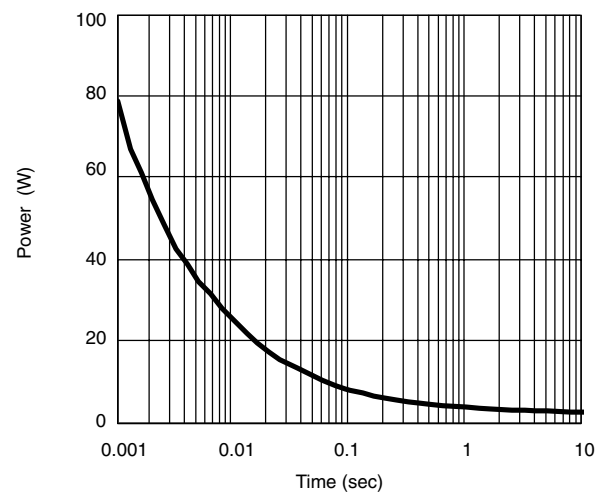
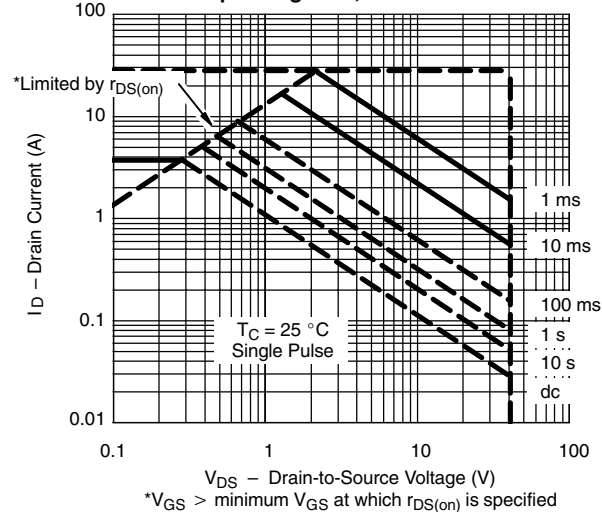
SPECIFICATIONS ($T_J = 25\text{ }^{\circ}\text{C}$ UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	0.6		1.6	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		40		mV/ $^{\circ}\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			-3.8		
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^{\circ}\text{C}$			10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	20			A
Drain-Source On-State Resistance ^a	$r_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 5.2\text{ A}$		0.033	0.040	Ω
		$V_{GS} = 4.5\text{ V}, I_D = 4.9\text{ A}$		0.037	0.045	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 5.2\text{ A}$		18		S
Diode Forward Voltage ^a	V_{SD}	$I_S = 1.7\text{ A}, V_{GS} = 0\text{ V}$		0.75	1.2	V
Dynamic^b						
Input Capacitance	C_{iss}	N-Channel $V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		700		pF
Output Capacitance	C_{oss}			76		
Reverse Transfer Capacitance	C_{rss}			45		
Total Gate Charge	Q_g	N-Channel $V_{DS} = 20\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 5.2\text{ A}$		8	12	nC
Gate-Source Charge	Q_{gs}			1.5		
Gate-Drain Charge	Q_{gd}			2.4		
Gate Resistance	R_g			1.9	2.9	
Turn-On Delay Time	$t_{d(on)}$	N-Channel $V_{DD} = 15\text{ V}, R_L = 15\text{ }\Omega$ $I_D \cong 1\text{ A}, V_{GEN} = 10\text{ V}, R_g = 6\text{ }\Omega$		7	11	ns
Rise Time	t_r			11	17	
Turn-Off Delay Time	$t_{d(off)}$			27	40	
Fall Time	t_f			8	13	
Source-Drain Reverse Recovery Time	t_{rr}	$I_F = 1.7\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		25	40	ns
Body Diode Reverse Recovery Charge	Q_{rr}	$I_F = 1.7\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		17	26	nC

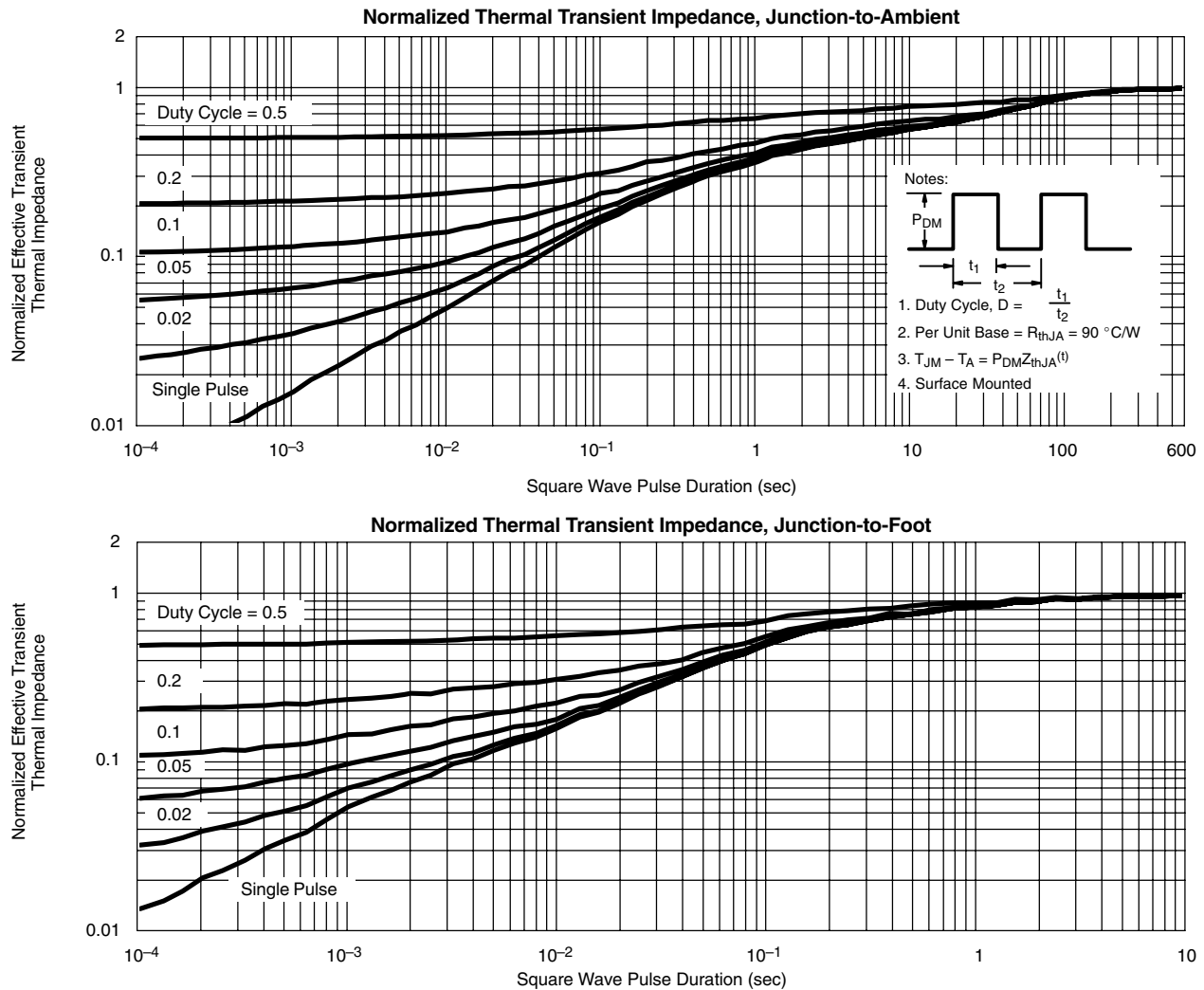
Notes

- 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 °C UNLESS NOTED)****Output Characteristics****Transfer Characteristics****On-Resistance vs. Drain Current****Capacitance****Gate Charge****On-Resistance vs. Junction Temperature**

TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)**Source-Drain Diode Forward Voltage****On-Resistance vs. Gate-to-Source Voltage****Threshold Voltage****Single Pulse Power, Junction-to-Ambient****Safe Operating Area, Junction-to-Foot**

**TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)**

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see <http://www.vishay.com/ppg?73661>.



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