



New Product

Si4567DY
Vishay Siliconix

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



RoHS
COMPLIANT

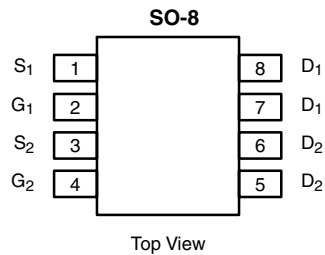
PRODUCT SUMMARY				
	V _{DS} (V)	r _{DS(on)} (Ω)	I _D (A) ^a	Q _g (Typ)
N-Channel	40	0.060 @ V _{GS} = 10 V	5.0	5.6
		0.070 @ V _{GS} = 4.5 V	4.7	
P-Channel	-40	0.085 @ V _{GS} = -10 V	-4.4	6
		0.122 @ V _{GS} = -4.5 V	-3.7	

FEATURES

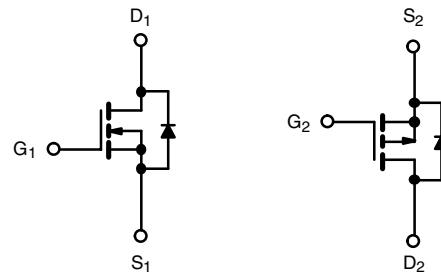
- TrenchFET® Power MOSFET
- 100% R_g Tested

APPLICATIONS

- CCFL Inverter



Ordering Information: Si4567DY-T1—E3 (Lead (Pb)-Free)



N-Channel MOSFET

P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T _A = 25 °C UNLESS OTHERWISE NOTED)					
Parameter		Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage		V _{DS}	40	-40	V
Gate-Source Voltage		V _{GS}	± 16		
Continuous Drain Current (T _J = 150 °C)	T _C = 25 °C	I _D	5	-4.4	A
	T _C = 70 °C		4.7	-3.7	
	T _A = 25 °C		4.1 ^{b, c}	-3.6 ^{b, c}	
	T _A = 70 °C		3.3 ^{b, c}	-2.9 ^{b, c}	
Pulsed Drain Current (10 μs Pulse Width)		I _{DM}	20	-20	A
Source-Drain Current Diode Current	T _C = 25 °C	I _S	2.3	-2.5	
	T _A = 25 °C		1.5 ^{b, c}	-1.6 ^{b, c}	
Pulsed Source-Drain Current		I _{SM}	20	-20	
Single Pulse Avalanche Current		I _{AS}	7	12	mJ
Single Pulse Avalanche Energy		E _{AS}	2.5	7.2	
Maximum Power Dissipation	T _C = 25 °C	P _D	2.75	2.95	W
	T _C = 70 °C		1.75	1.90	
	T _A = 25 °C		1.85 ^{b, c}	1.95 ^{b, c}	
	T _A = 70 °C		1.18 ^{b, c}	1.25 ^{b, c}	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	-55 to 150		°C

THERMAL RESISTANCE RATINGS							
Parameter		Symbol	N-Channel		P-Channel		Unit
			Typ	Max	Typ	Max	
Maximum Junction-to-Ambient ^{b, d}	t ≤ 10 sec	R _{thJA}	57	67.5	54	64	°C/W
Maximum Junction-to-Foot (Drain)	Steady-State	R _{thJF}	35	45	33	42	

Notes

- Based on T_C = 25 °C.
- Surface Mounted on 1" x 1" FR4 Board.
- t = 10 sec
- Maximum under steady state conditions is 120 °C/W (n-channel) and 110 °C/W (p-channel).

SPECIFICATIONS (T _J = 25 °C UNLESS OTHERWISE NOTED)							
Parameter	Symbol	Test Condition		Min	Typ ^a	Max	Unit
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	N-Ch	40			V
		V _{GS} = 0 V, I _D = -250 μA	P-Ch	-40			
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA	N-Ch		40		
		I _D = -250 μA	P-Ch		-40		
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J	I _D = 250 μA	N-Ch		-4.6		
		I _D = -250 μA	P-Ch		3.5		
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	N-Ch	0.8		2.2	
		V _{DS} = V _{GS} , I _D = -250 μA	P-Ch	-0.8		-2.2	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 16 V	N-Ch			100	nA
			P-Ch			-100	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 40 V, V _{GS} = 0 V	N-Ch			1	μA
		V _{DS} = -40 V, V _{GS} = 0 V	P-Ch			-1	
		V _{DS} = 40 V, V _{GS} = 0 V, T _J = 55 °C	N-Ch			10	
		V _{DS} = -40 V, V _{GS} = 0 V, T _J = 55 °C	P-Ch			-10	
On-State Drain Current ^b	I _{D(on)}	V _{DS} = 5 V, V _{GS} = 10 V	N-Ch	20			A
		V _{DS} = -5 V, V _{GS} = -10 V	P-Ch	-20			
Drain-Source On-State Resistance ^b	r _{DS(on)}	V _{GS} = 10 V, I _D = 4.1 A	N-Ch		0.048	0.060	Ω
		V _{GS} = -10 V, I _D = -3.6 A	P-Ch		0.068	0.085	
		V _{GS} = 4.5 V, I _D = 3.8 A	N-Ch		0.056	0.070	
		V _{GS} = -4.5 V, I _D = -2.9 A	P-Ch		0.097	0.122	
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 4.1 A	N-Ch		15		S
		V _{DS} = -15 V, I _D = -3.6 A	P-Ch		7		
Dynamic^a							
Input Capacitance	C _{iss}	N-Channel V _{DS} = 20 V, V _{GS} = 0 V, f = 1 MHz P-Channel V _{DS} = -20 V, V _{GS} = 0 V, f = 1 MHz	N-Ch		355		pF
Output Capacitance	C _{oss}		N-Ch		50		
			P-Ch		80		
Reverse Transfer Capacitance	C _{rss}		N-Ch		29		
			P-Ch		56		
Total Gate Charge	Q _g		V _{DS} = 20 V, V _{GS} = 10 V, I _D = 5 A	N-Ch		8	
		V _{DS} = -20 V, V _{GS} = -10 V, I _D = -5 A	P-Ch		12	18	
	Gate-Source Charge	Q _{gs}	N-Channel V _{DS} = 20 V, V _{GS} = 4.5 V, I _D = 5 A P-Channel V _{DS} = -20 V, V _{GS} = -4.5 V, I _D = -5 A	N-Ch		3.7	6
				P-Ch		6	9
Gate-Drain Charge	Q _{gd}	N-Ch			1.1		
		P-Ch			1.5		
Gate Resistance	R _g	f = 1 MHz	N-Ch	1.6	3.4	5.2	Ω
			P-Ch	2.8	5.7	8.6	



SPECIFICATIONS (T _J = 25 °C UNLESS OTHERWISE NOTED)							
Parameter	Symbol	Test Condition	Min	Typ ^a	Max	Unit	
Dynamic^a							
Turn-On Delay Time	t _{d(on)}	N-Channel V _{DD} = 20 V, R _L = 4 Ω I _D ≅ 1 A, V _{GEN} = 10 V, R _g = 1 Ω P-Channel V _{DD} = -20 V, R _L = 4 Ω I _D ≅ -1 A, V _{GEN} = -10 V, R _g = 1 Ω	N-Ch		8	13	ns
			P-Ch		10	15	
Rise Time	t _r		N-Ch		20	30	
			P-Ch		16	25	
Turn-Off Delay Time	t _{d(off)}		N-Ch		23	35	
			P-Ch		19	30	
Fall Time	t _f		N-Ch		27	42	
			P-Ch		10	15	
Turn-On Delay Time	t _{d(on)}	N-Channel V _{DD} = 20 V, R _L = 4 Ω I _D ≅ 1 A, V _{GEN} = 4.5 V, R _g = 1 Ω P-Channel V _{DD} = -20 V, R _L = 4 Ω I _D ≅ -1 A, V _{GEN} = -4.5 V, R _g = 16 Ω	N-Ch		74	110	ns
			P-Ch		23	35	
Rise Time	t _r		N-Ch		95	145	
			P-Ch		93	140	
Turn-Off Delay Time	t _{d(off)}		N-Ch		31	48	
			P-Ch		30	45	
Fall Time	t _f		N-Ch		33	50	
			P-Ch		25	38	
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	N-Ch			2.3	A
			P-Ch			-2.5	
Pulse Diode Forward Current ^a	I _{SM}		N-Ch			20	A
			P-Ch			-20	
Body Diode Voltage	V _{SD}	I _S = 1.5 A	N-Ch		0.8	1.2	V
		I _S = -1.6 A	P-Ch		-0.8	-1.2	
Body Diode Reverse Recovery Time	t _{rr}	N-Channel I _F = 2 A, di/dt = 100 A/μs, T _J = 25 °C P-Channel I _F = -2 A, di/dt = -100 A/μs, T _J = 25 °C	N-Ch		26	40	ns
			P-Ch		26	40	
Body Diode Reverse Recovery Charge	Q _{rr}		N-Ch		26	40	nC
			P-Ch		22	35	
Reverse Recovery Fall Time	t _a		N-Ch		13		ns
			P-Ch		12		
Reverse Recovery Rise Time	t _b	N-Ch		13		ns	
		P-Ch		14			

Notes

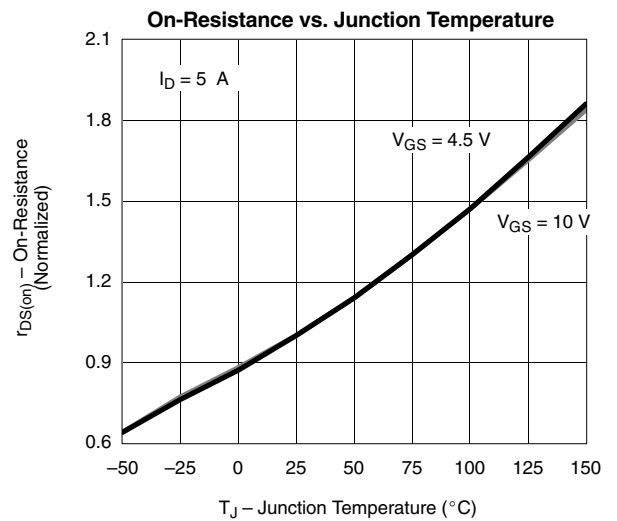
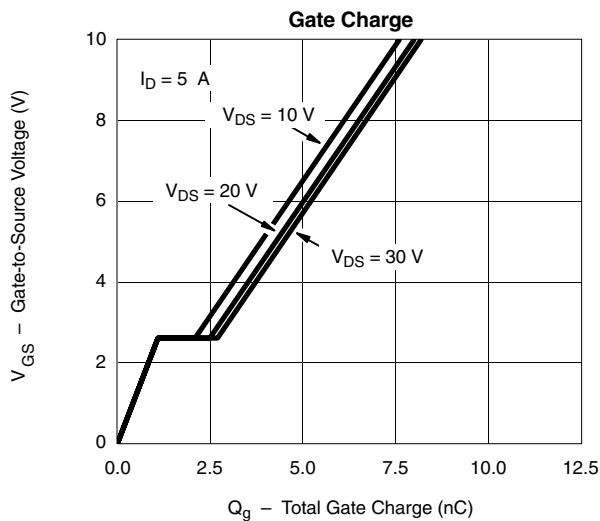
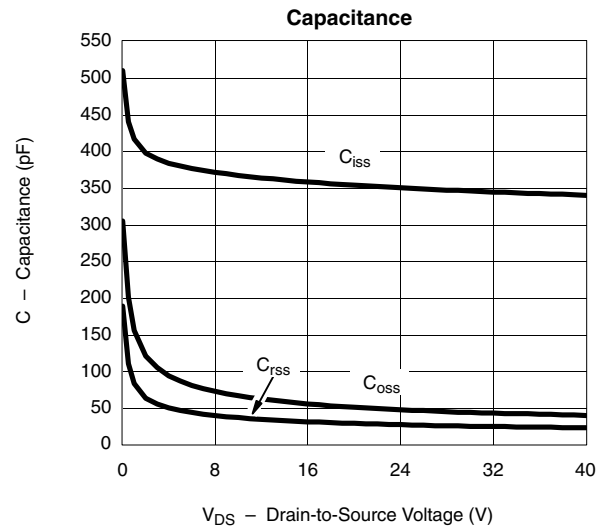
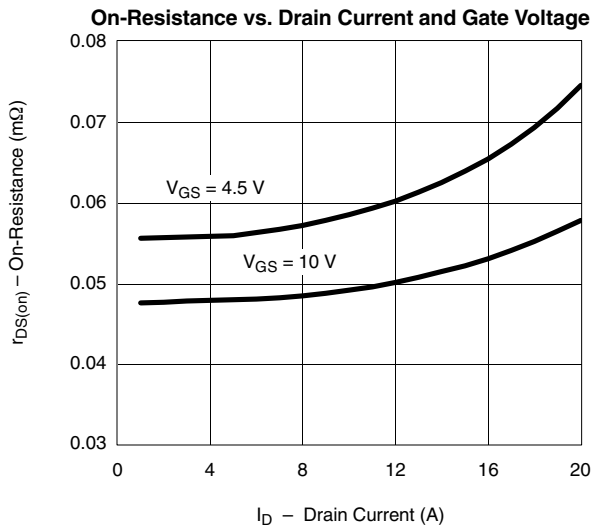
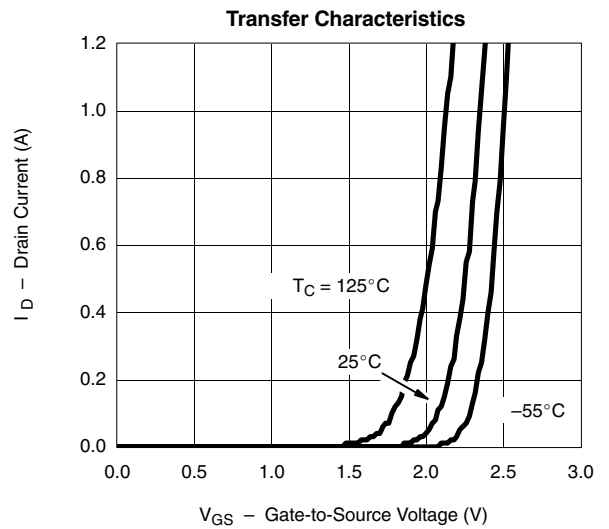
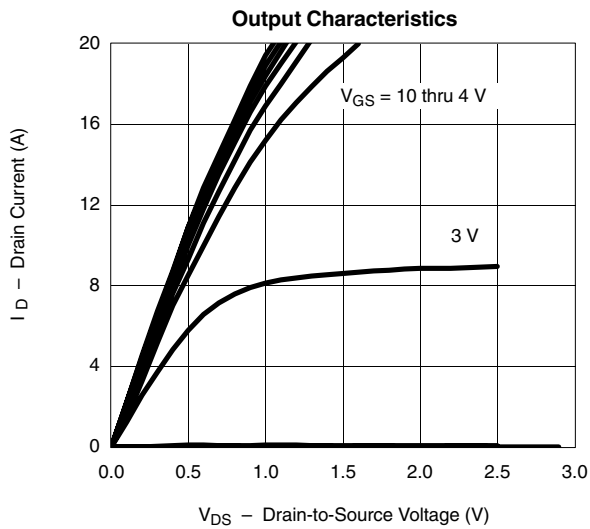
- a. Guaranteed by design, not subject to production testing.
- b. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.

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)

N-CHANNEL

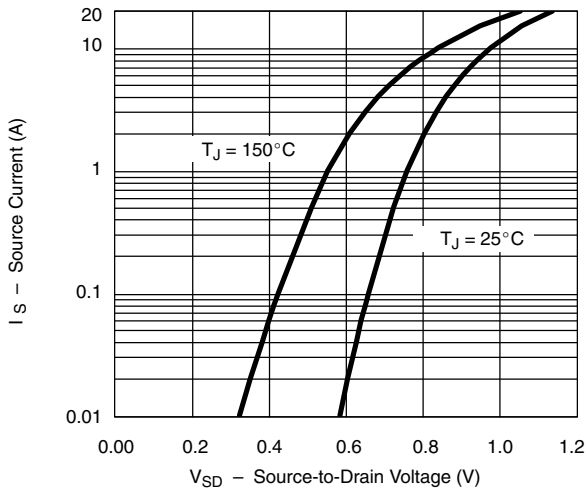




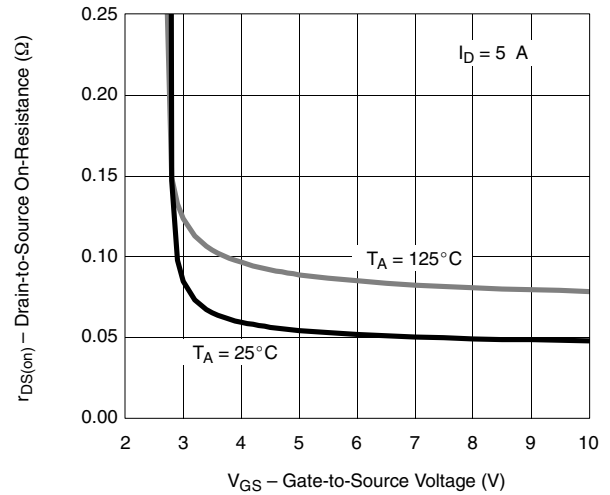
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

N-CHANNEL

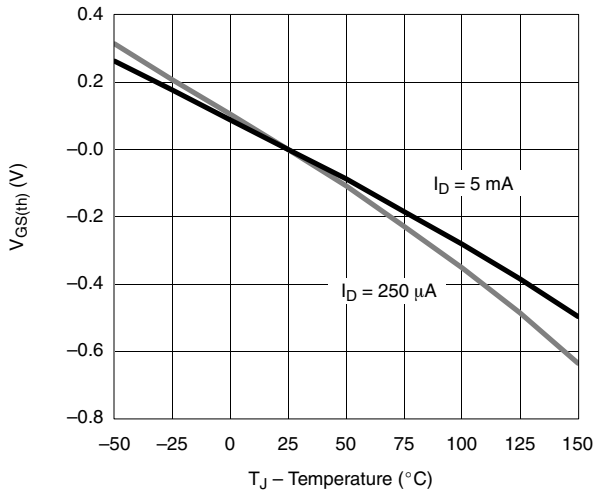
Source-Drain Diode Forward Voltage



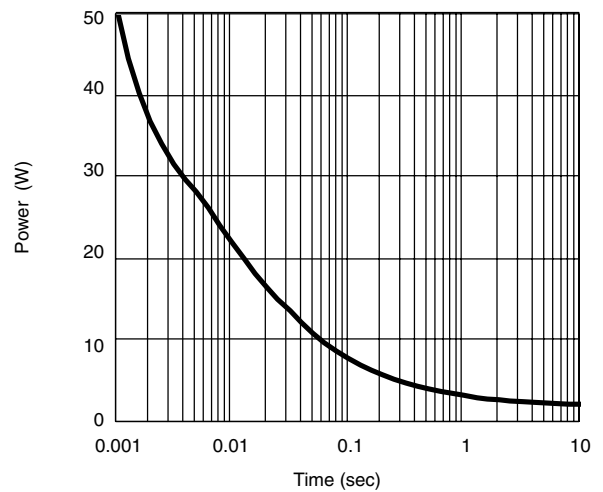
On-Resistance vs. Gate-to-Source Voltage



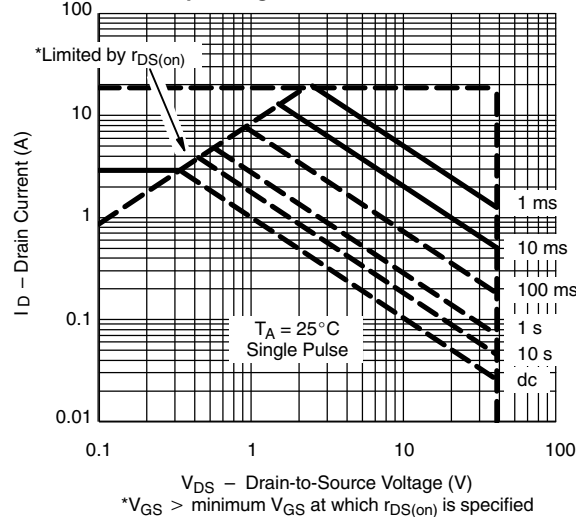
Threshold Voltage



Single Pulse Power, Junction-to-Ambient

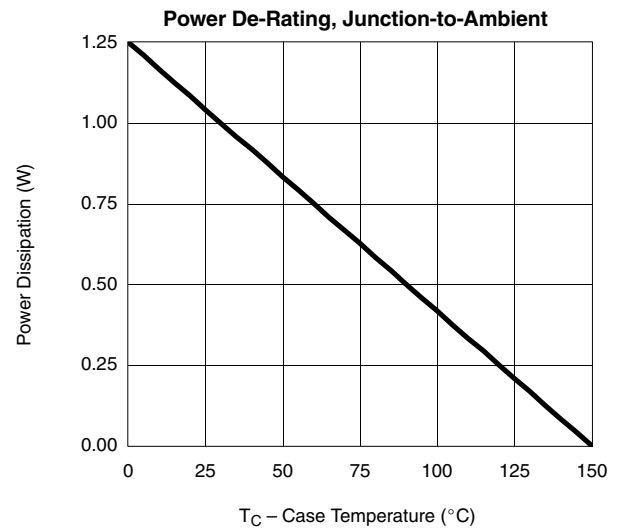
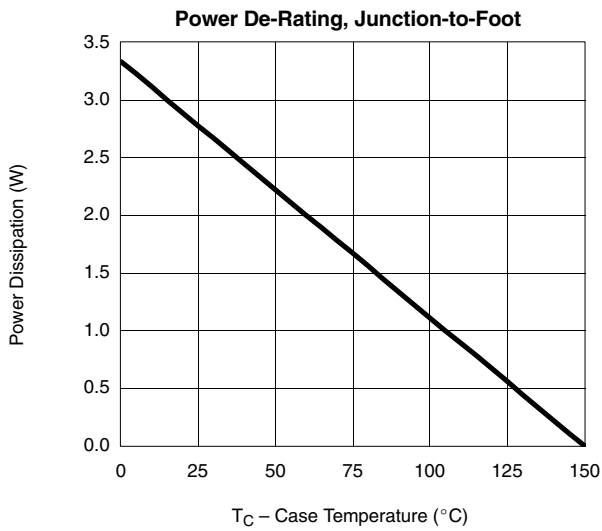
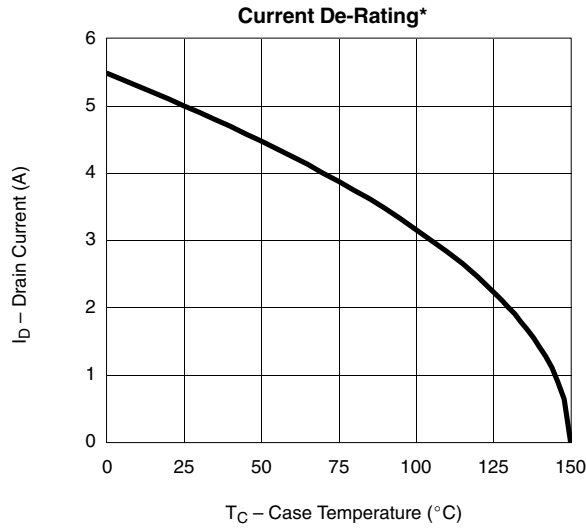


Safe Operating Area, Junction-to-Ambient



TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

N-CHANNEL

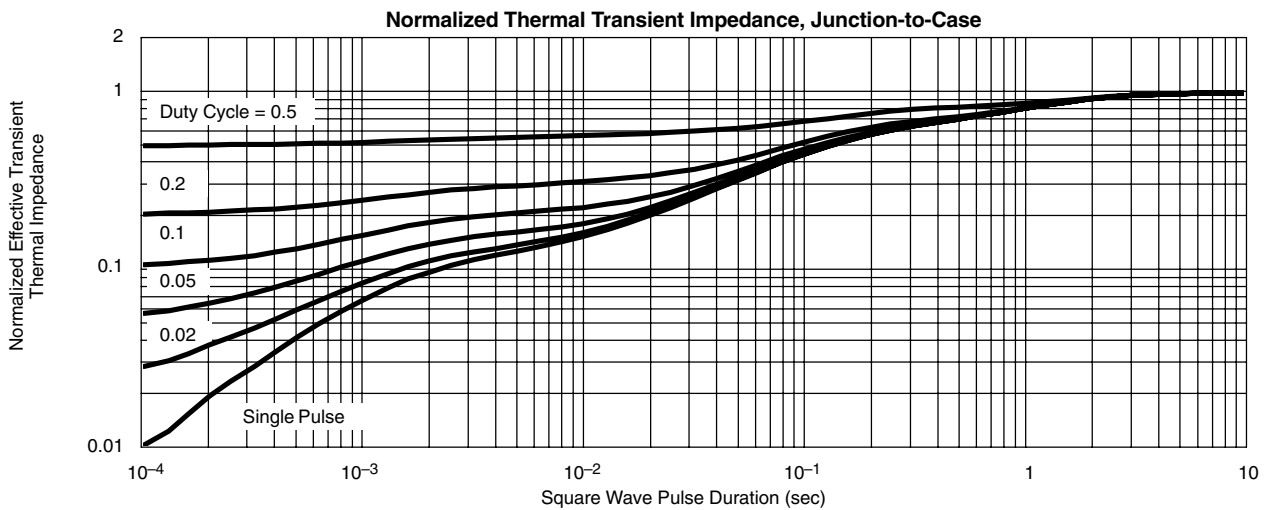
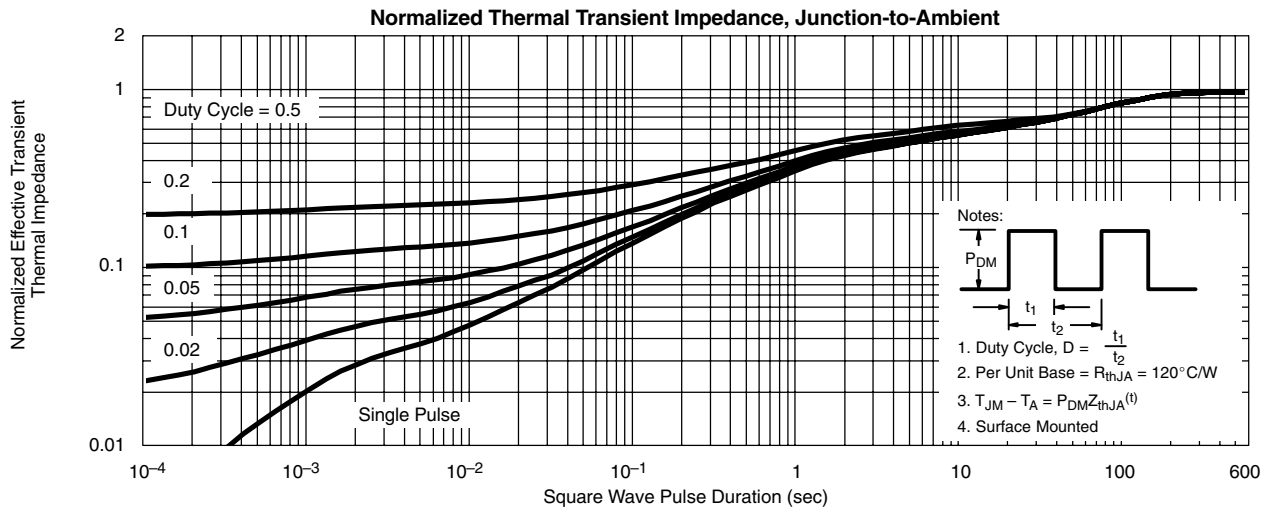


*The power dissipation P_b is based on $T_{J(max)} = 150^\circ\text{C}$, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.



TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

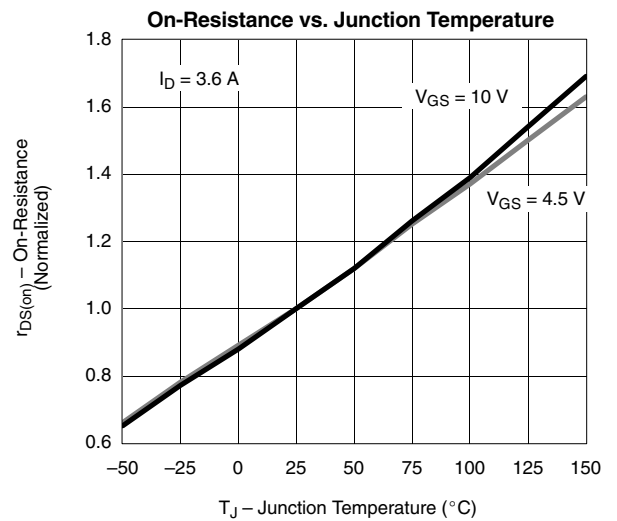
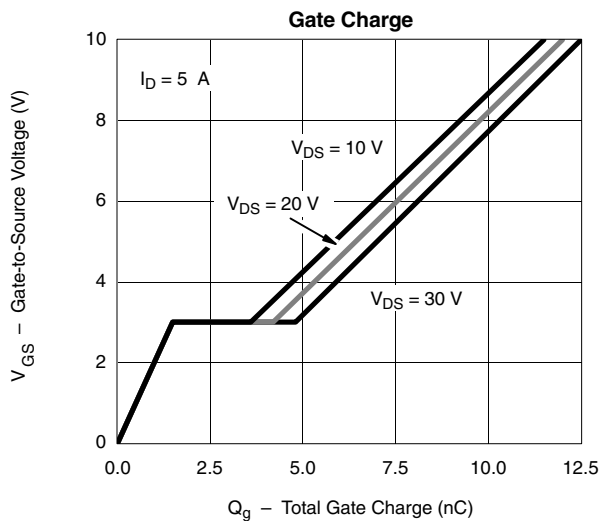
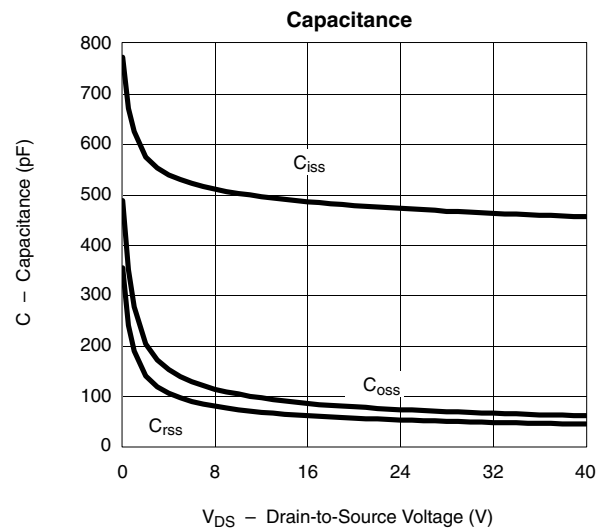
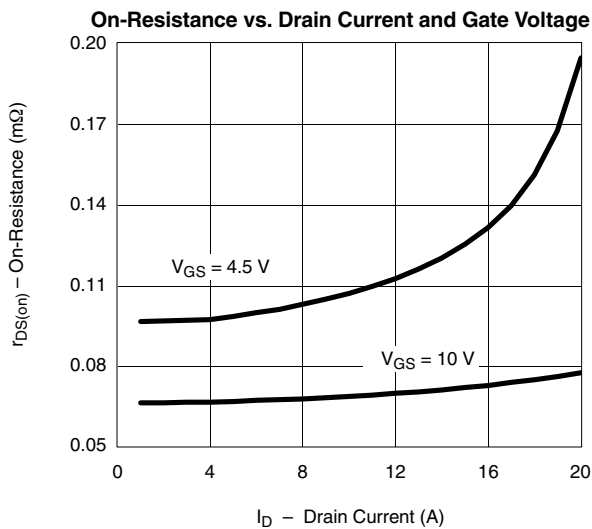
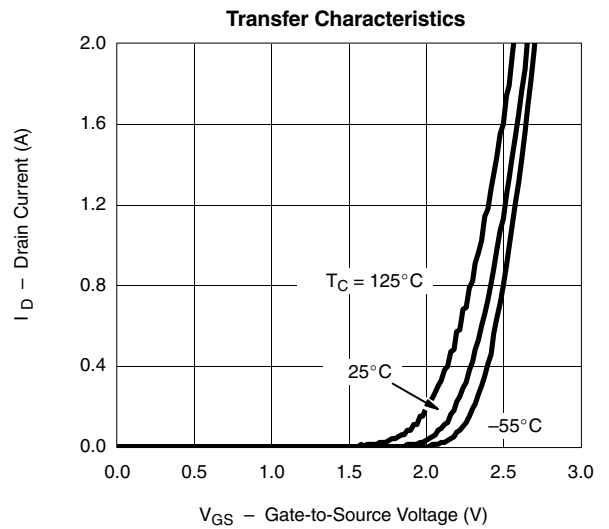
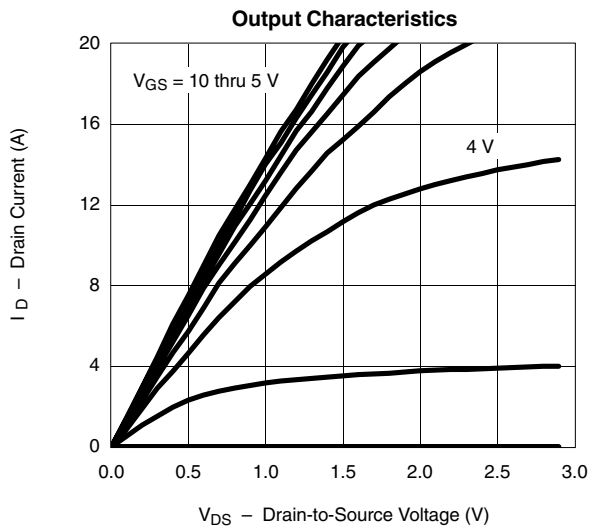
N-CHANNEL





TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

P-CHANNEL

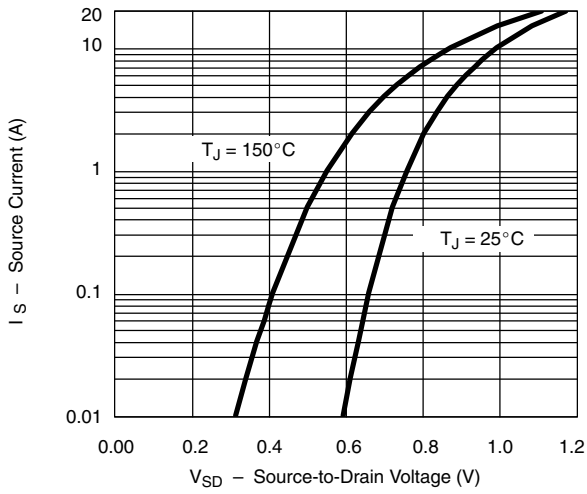




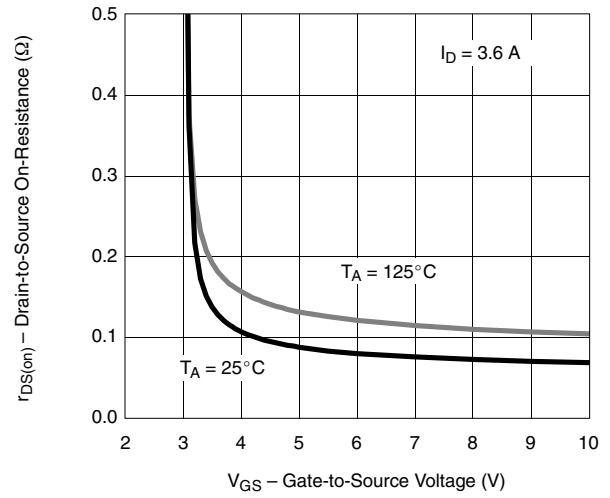
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

P-CHANNEL

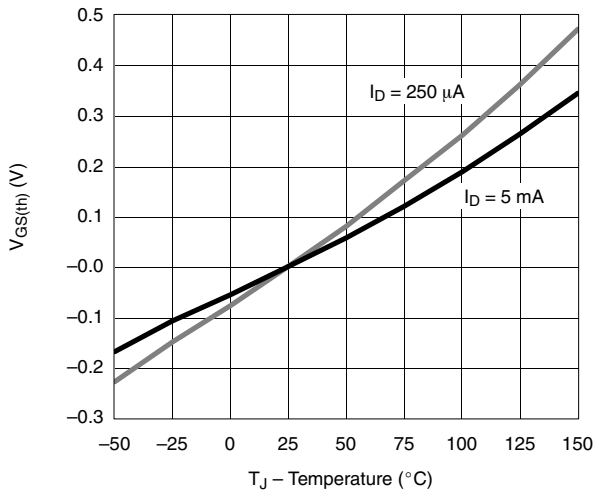
Source-Drain Diode Forward Voltage



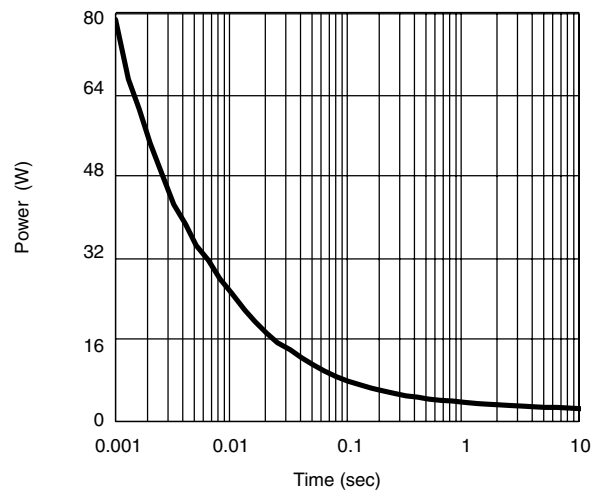
On-Resistance vs. Gate-to-Source Voltage



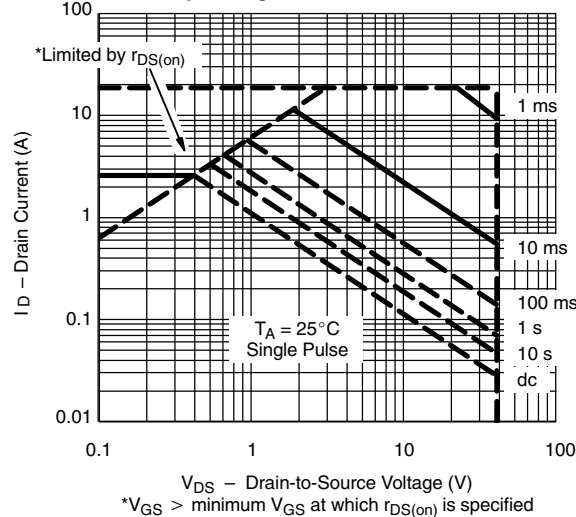
Threshold Voltage



Single Pulse Power, Junction-to-Ambient

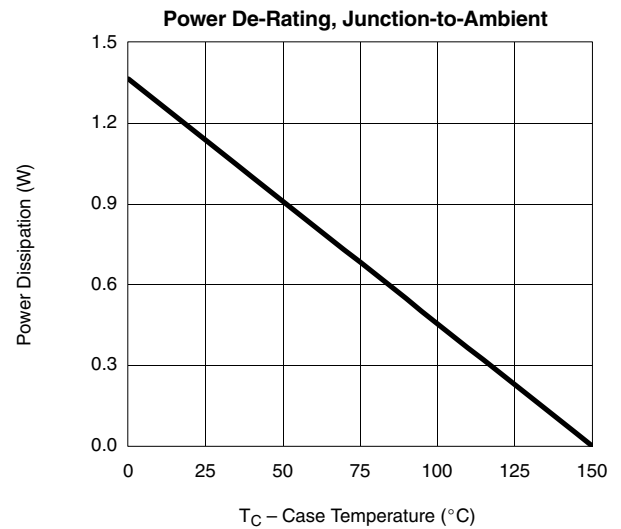
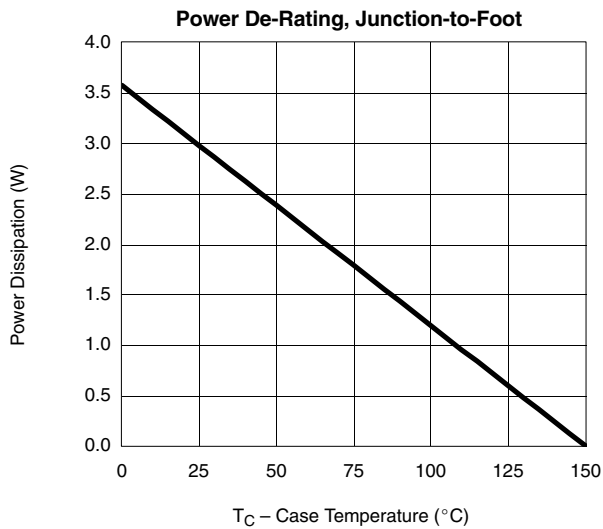
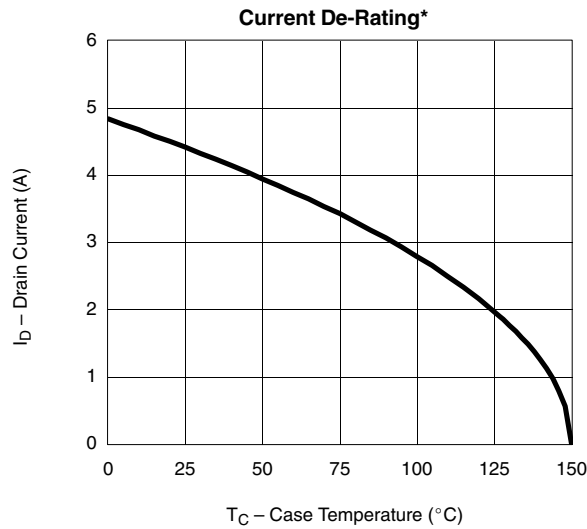


Safe Operating Area, Junction-to-Ambient



TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

P-CHANNEL

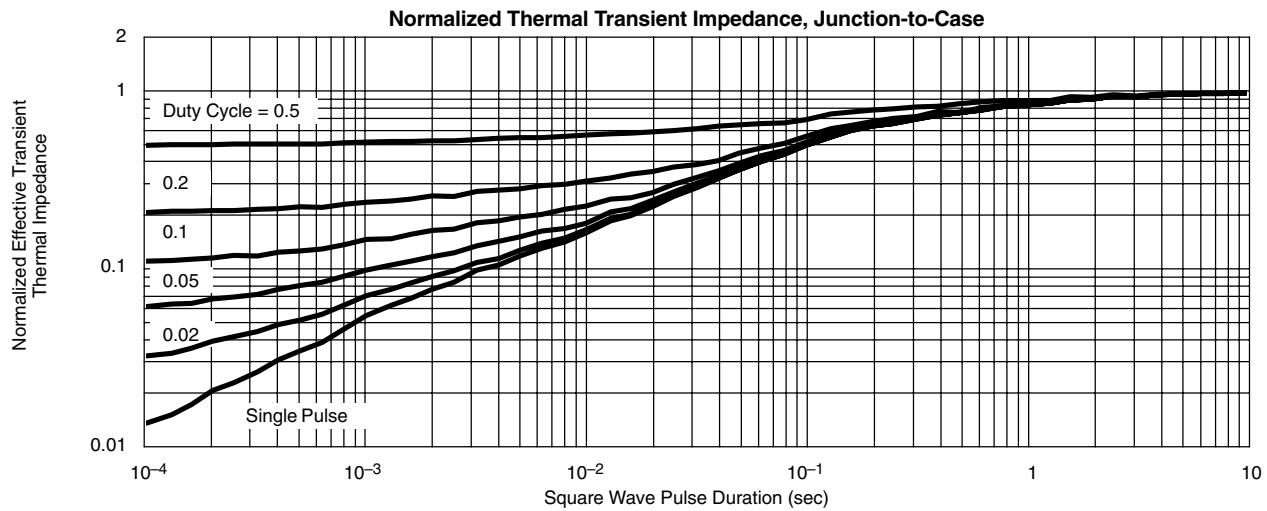
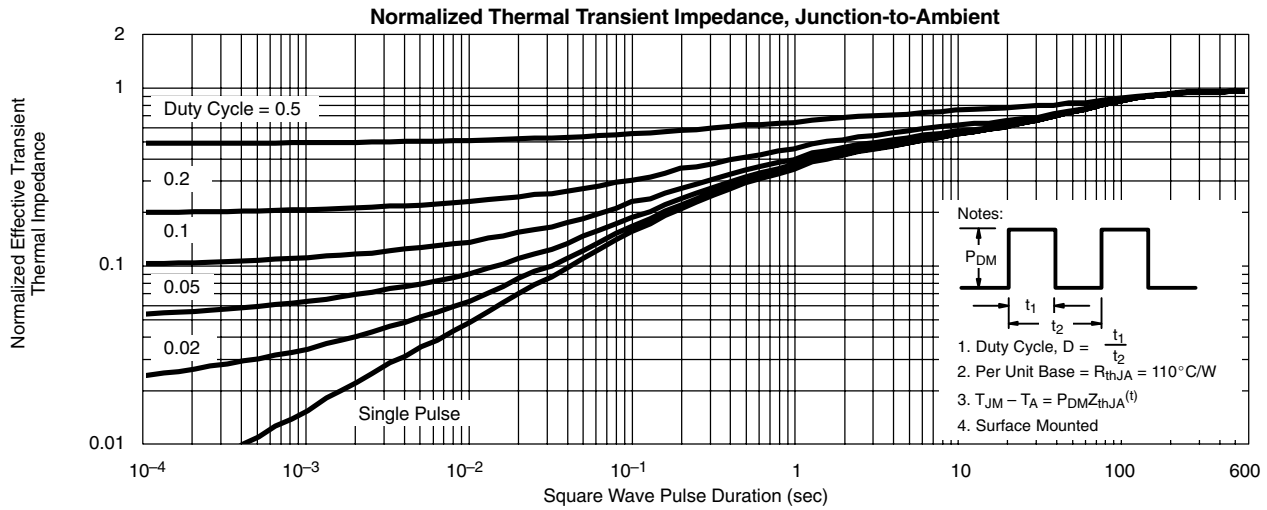


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TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

P-CHANNEL



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