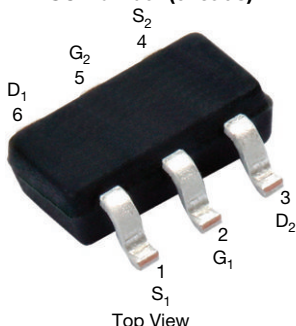


N- and P-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY

	V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g (TYP.)
N-Channel	20	0.390 at V _{GS} = 4.5 V	0.7	0.55
		0.510 at V _{GS} = 2.7 V	0.5	
		0.578 at V _{GS} = 2.5 V	0.5	
P-Channel	-20	0.850 at V _{GS} = -4.5 V	-0.5	0.95
		1.350 at V _{GS} = -2.7 V	-0.5	
		1.480 at V _{GS} = -2.5 V	-0.3	

SOT-363
SC-70 Dual (6 leads)



Top View

FEATURES

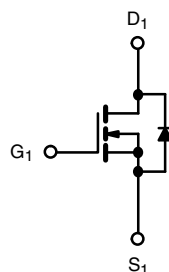
- TrenchFET® power MOSFET
- 100 % R_g tested
- Material categorization:
for definitions of compliance please see
www.vishay.com/doc?99912

APPLICATIONS

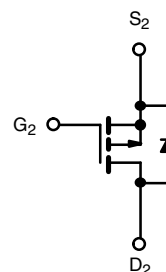
- Load switch
- DC/DC converter



RoHS
COMPLIANT
HALOGEN
FREE



N-Channel MOSFET



P-Channel MOSFET

Marking Code: RH

Ordering Information:

Si1553CDL-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)

PARAMETER		SYMBOL	N-CHANNEL	P-CHANNEL	UNIT
Drain-Source Voltage		V _{DS}	20	-20	V
Gate-Source Voltage		V _{GS}	± 12		
Continuous Drain Current (T _J = 150 °C)	T _C = 25 °C	I _D	0.7	-0.5	A
	T _C = 70 °C		0.6	-0.4	
	T _A = 25 °C		0.7 ^{b, c}	-0.4 ^{b, c}	
	T _A = 70 °C		0.5 ^{b, c}	-0.4 ^{b, c}	
Source-Drain Current Diode Current	T _C = 25 °C	I _S	0.3	-0.3	
	T _A = 25 °C		0.2 ^{b, c}	-0.2 ^{b, c}	
Pulsed Drain Current (t = 300 μs)		I _{DM}	2	-1	
Maximum Power Dissipation	T _C = 25 °C	P _D	0.34	0.34	W
	T _C = 70 °C		0.22	0.22	
	T _A = 25 °C		0.29 ^{b, c}	0.29 ^{b, c}	
	T _A = 70 °C		0.18 ^{b, c}	0.18 ^{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 s	R _{thJA}	365	438	365	438	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	R _{thJF}	308	370	308	370	

Notes

- Based on T_C = 25 °C.
- Surface mounted on 1" x 1" FR4 board.
- t = 10 s.
- Maximum under steady state conditions is 486 °C/W (N-Channel) and 486 °C/W (P-Channel).



SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)								
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP. ^a	MAX.	UNIT	
Static								
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	N-Ch	20	-	-	V	
		V _{GS} = 0 V, I _D = -250 μA	P-Ch	-20	-	-		
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA	N-Ch	-	24	-	mV/°C	
		I _D = -250 μA	P-Ch	-	-13	-		
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J	I _D = 250 μA	N-Ch	-	-1.8	-		V
		I _D = -250 μA	P-Ch	-	2.3	-		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	N-Ch	0.6	-	1.5	nA	
		V _{DS} = V _{GS} , I _D = -250 μA	P-Ch	-0.6	-	-1.5		
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 12 V	N-Ch	-	-	± 100	μA	
			P-Ch	-	-	± 100		
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V	N-Ch	-	-	1	A	
		V _{DS} = -20 V, V _{GS} = 0 V	P-Ch	-	-	-1		
		V _{DS} = 20 V, V _{GS} = 0 V, T _J = 55 °C	N-Ch	-	-	10		
		V _{DS} = -20 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} = 5 V	N-Ch	2	-	-	Ω	
		V _{DS} = -5 V, V _{GS} = -5 V	P-Ch	-1	-	-		
Drain-Source On-State Resistance ^b	R _{DS(on)}	V _{GS} = 4.5 V, I _D = 0.7 A	N-Ch	-	0.325	0.390	S	
		V _{GS} = -4.5 V, I _D = -0.4 A	P-Ch	-	0.708	0.850		
		V _{GS} = 2.7 V, I _D = 0.4 A	N-Ch	-	0.425	0.510		
		V _{GS} = -2.7 V, I _D = -0.2 A	P-Ch	-	1.130	1.350		
		V _{GS} = 2.5 V, I _D = 0.4 A	N-Ch	-	0.462	0.578		
		V _{GS} = -2.5V, I _D = -0.2 A	P-Ch	-	1.230	1.480		
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 0.7 A	N-Ch	-	1.5	-	pF	
		V _{DS} = -15 V, I _D = -0.5 A	P-Ch	-	0.8	-		
Dynamic ^a								
Input Capacitance	C _{iss}	N-Channel V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz P-Channel V _{DS} = -10 V, V _{GS} = 0 V, f = 1 MHz	N-Ch	-	38	-	nC	
Output Capacitance	C _{oss}		P-Ch	-	43	-		
			N-Ch	-	14	-		
Reverse Transfer Capacitance	C _{rss}		P-Ch	-	16	-		
		N-Ch	-	6	-			
Total Gate Charge	Q _g	N-Channel V _{DS} = 10 V, V _{GS} = 10 V, I _D = 0.7 A P-Channel V _{DS} = -10 V, V _{GS} = -10 V, I _D = -0.5 A	N-Ch	-	1.2	1.8	Ω	
			P-Ch	-	1.9	3		
			N-Ch	-	0.55	1.1		
			P-Ch	-	0.95	1.5		
Gate-Source Charge	Q _{gs}	N-Channel V _{DS} = 10 V, V _{GS} = 4.5 V I _D = 0.5 A P-Channel V _{DS} = -10 V, V _{GS} = -4.5 V, I _D = -0.4 A	N-Ch	-	0.15	-		
			P-Ch	-	0.25	-		
Gate-Drain Charge	Q _{gd}		N-Ch	-	0.15	-		
			P-Ch	-	0.25	-		
Gate Resistance	R _g	f = 1 MHz	N-Ch	1.5	7.2	14.4	Ω	
			P-Ch	2.1	10.3	20.6		



SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)								
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP. ^a	MAX.	UNIT	
Dynamic ^a								
Turn-On Delay Time	t _{d(on)}	N-Channel V _{DD} = 10 V, R _L = 20 Ω I _D ≡ 0.5 A, V _{GEN} = 10 V, R _g = 1 Ω	N-Ch	-	2	4	ns	
			P-Ch	-	2	4		
Rise Time	t _r		N-Ch	-	14	21		
			P-Ch	-	9	18		
Turn-Off Delay Time	t _{d(off)}		N-Ch	-	11	20		
			P-Ch	-	10	20		
Fall Time	t _f	P-Channel V _{DD} = -10 V, R _L = 25 Ω I _D ≡ -0.4 A, V _{GEN} = -10 V, R _g = 1 Ω	N-Ch	-	7	14		
			P-Ch	-	7	14		
Turn-On Delay Time	t _{d(on)}		N-Channel V _{DD} = 10 V, R _L = 20 Ω I _D ≡ 0.5 A, V _{GEN} = 4.5 V, R _g = 1 Ω	N-Ch	-	16		24
				P-Ch	-	15		23
Rise Time	t _r			N-Ch	-	22		33
				P-Ch	-	15		23
Turn-Off Delay Time	t _{d(off)}	P-Channel V _{DD} = -10 V, R _L = 25 Ω I _D ≡ -0.4 A, V _{GEN} = -4.5 V, R _g = 1 Ω	N-Ch	-	22	33		
			P-Ch	-	12	20		
Fall Time	t _f		N-Ch	-	13	20		
			P-Ch	-	8	16		
Drain-Source Body Diode Characteristics								
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	N-Ch	-	-	0.3	A	
			P-Ch	-	-	-0.3		
Pulse Diode Forward Current ^a	I _{SM}		N-Ch	-	-	2		
			P-Ch	-	-	-1		
Body Diode Voltage	V _{SD}	I _S = 0.5 A	N-Ch	-	0.8	1.2	V	
		I _S = -0.4 A	P-Ch	-	-0.8	-1.2		
Body Diode Reverse Recovery Time	t _{rr}	N-Channel I _F = 0.5 A, dI/dt = 100 A/μs, T _J = 25 °C	N-Ch	-	8	15	ns	
			P-Ch	-	12	20		
Body Diode Reverse Recovery Charge	Q _{rr}		N-Ch	-	1	2	nC	
			P-Ch	-	5	10		
Reverse Recovery Fall Time	t _a		P-Channel I _F = -0.4 A, dI/dt = -100 A/μs, T _J = 25 °C	N-Ch	-	4	-	ns
				P-Ch	-	9	-	
Reverse Recovery Rise Time	t _b	N-Ch		-	4	-		
		P-Ch		-	3	-		

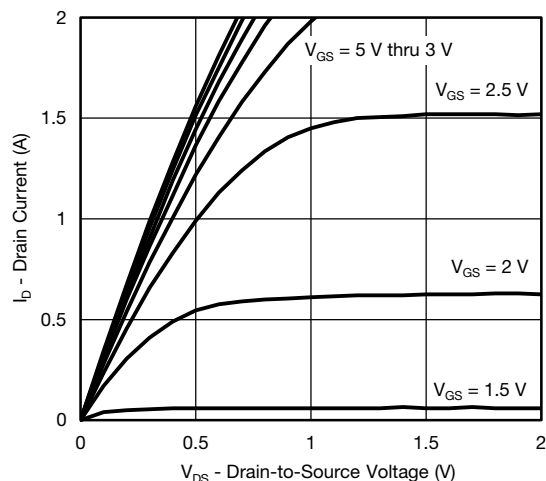
Notes

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

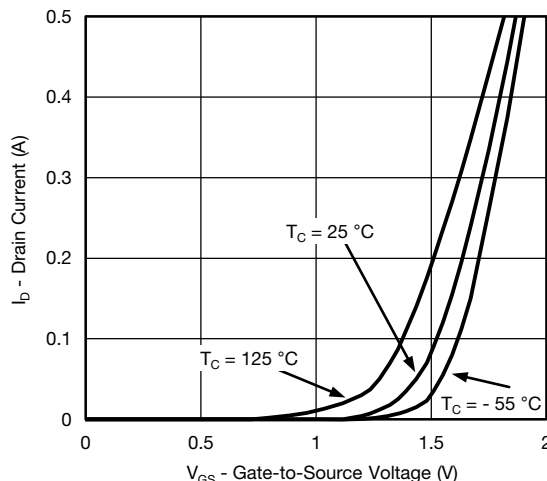
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



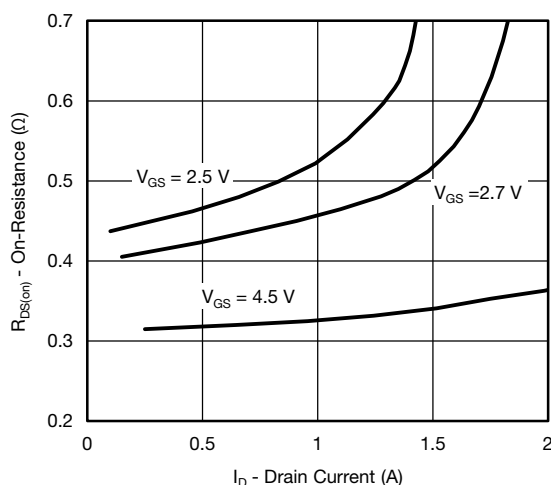
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



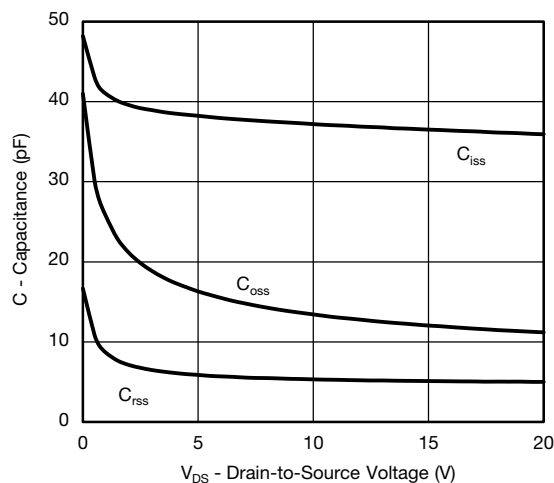
Output Characteristics



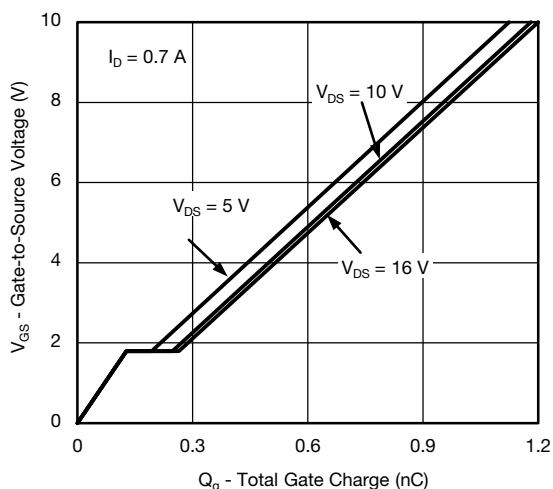
Transfer Characteristics



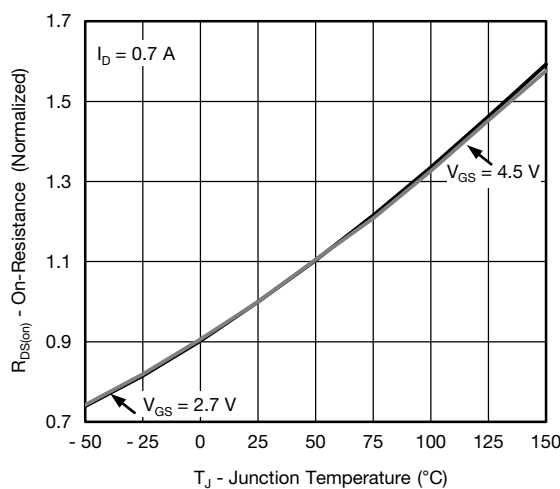
On-Resistance vs. Drain Current and Gate Voltage



Capacitance



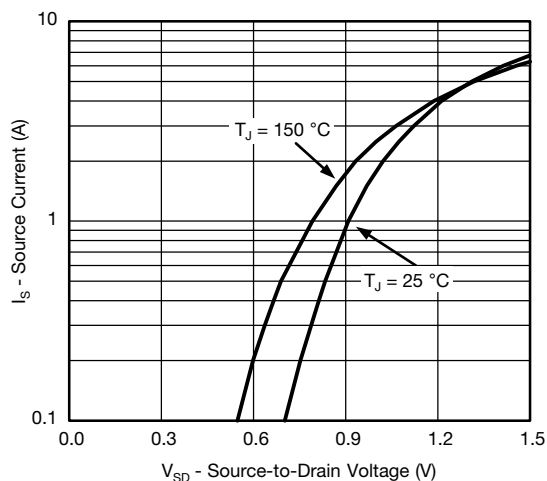
Gate Charge



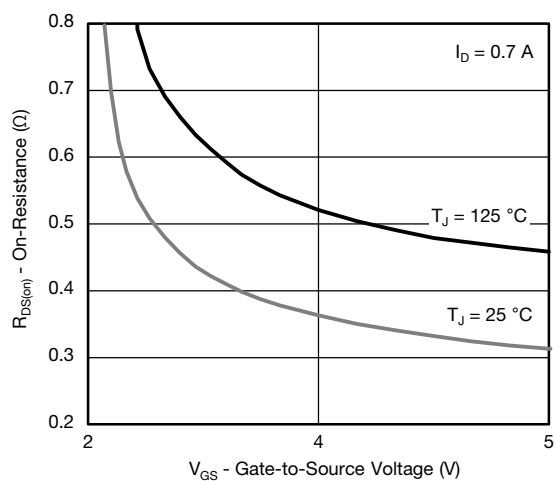
On-Resistance vs. Junction Temperature



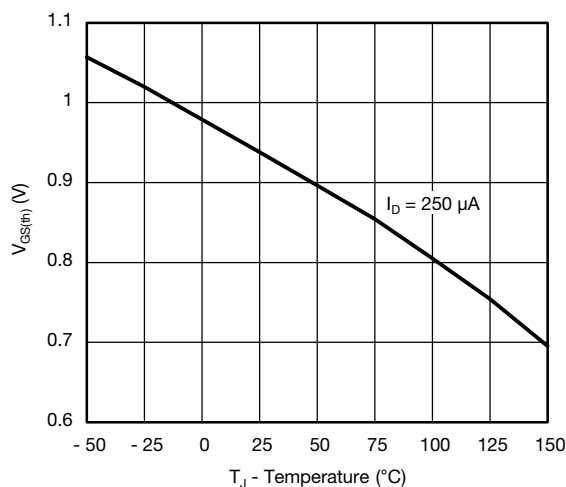
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



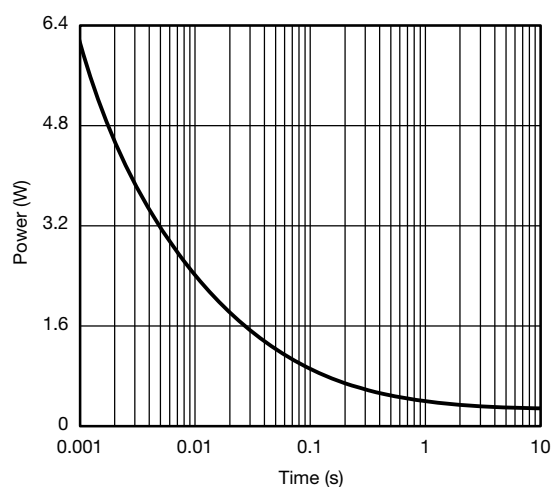
Source-Drain Diode Forward Voltage



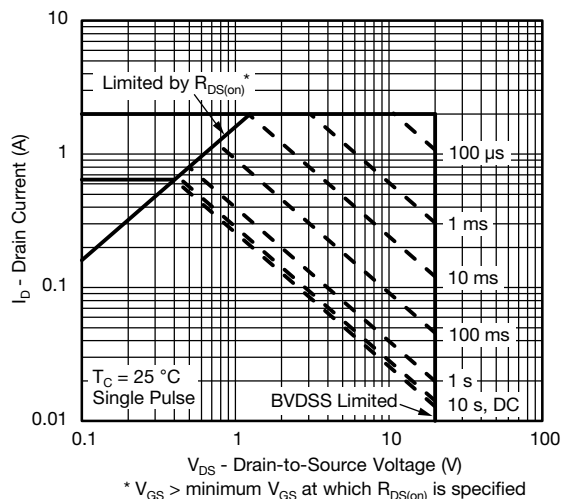
On-Resistance vs. Gate-to-Source Voltage



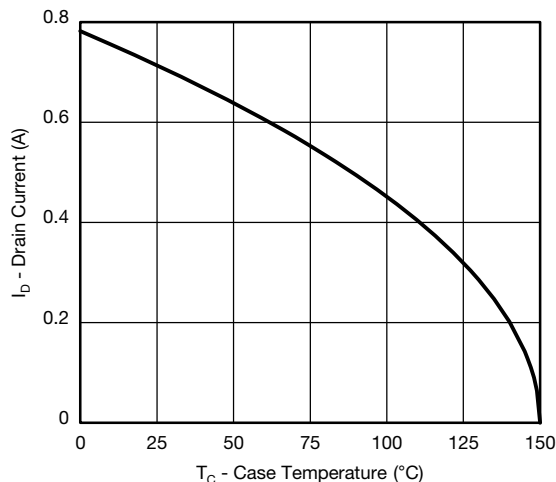
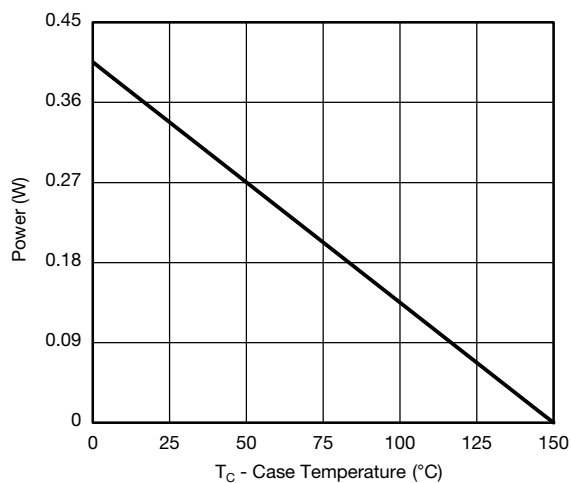
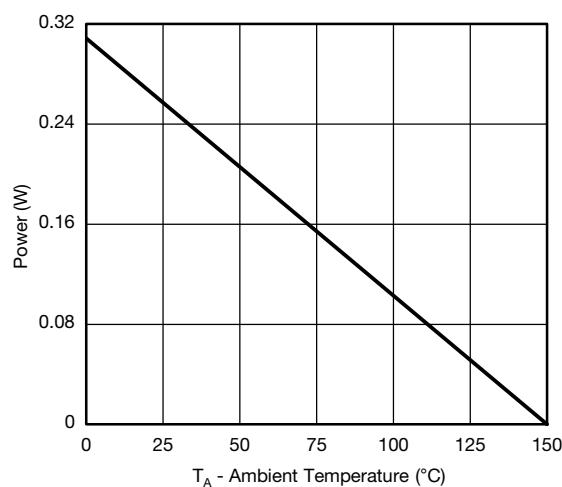
Threshold Voltage



Single Pulse Power, Junction-to-Ambient



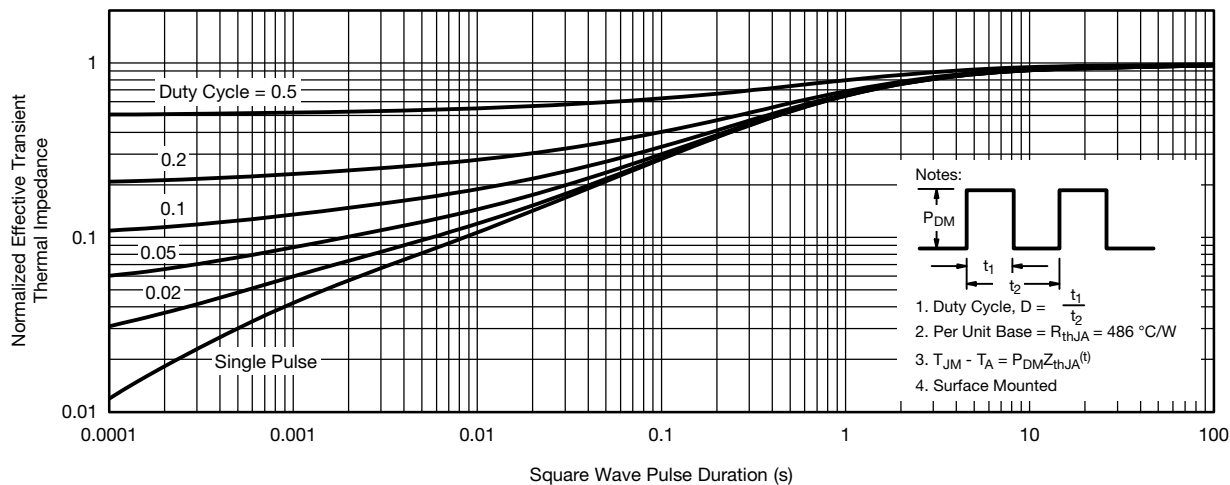
Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Current Derating*

Power Derating, Junction-to-Foot

Power Derating, Junction-to-Ambient

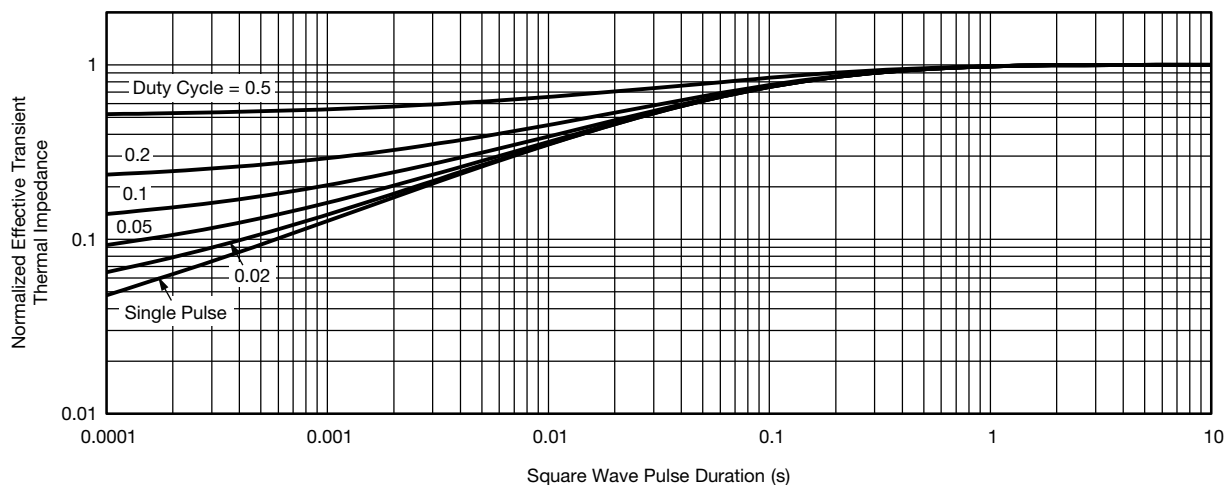
* The power dissipation P_D is based on $T_{J(max)} = 150\text{ °C}$, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package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



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



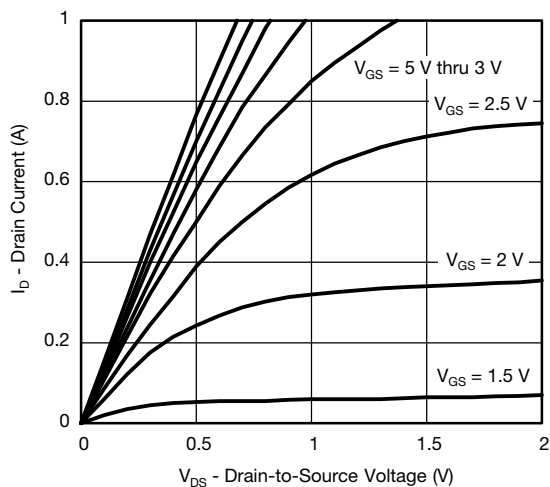
Normalized Thermal Transient Impedance, Junction-to-Ambient



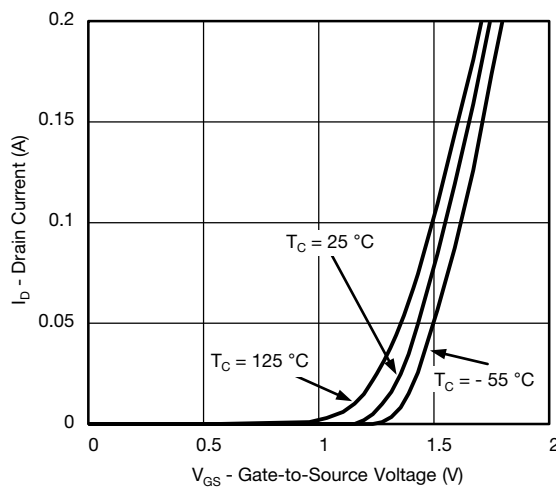
Normalized Thermal Transient Impedance, Junction-to-Foot



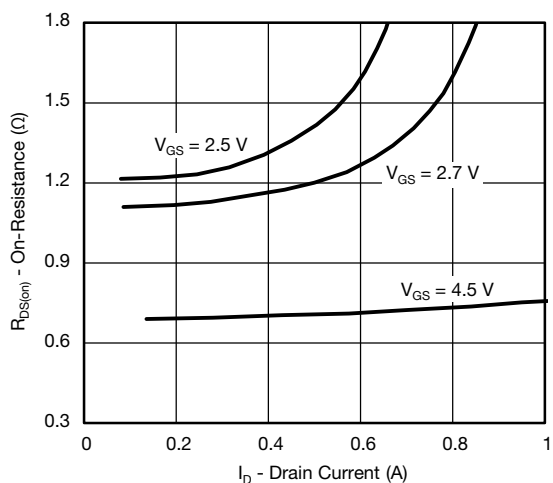
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



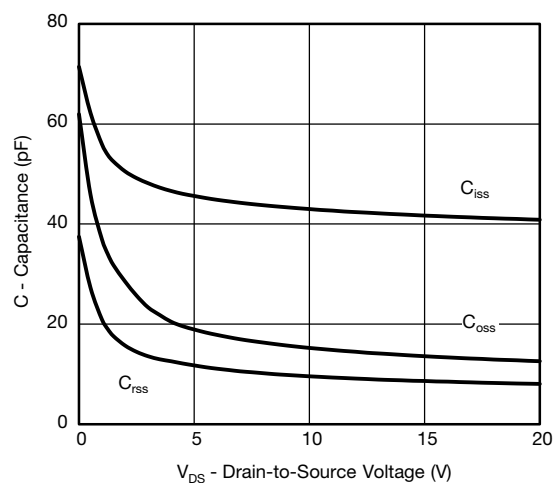
Output Characteristics



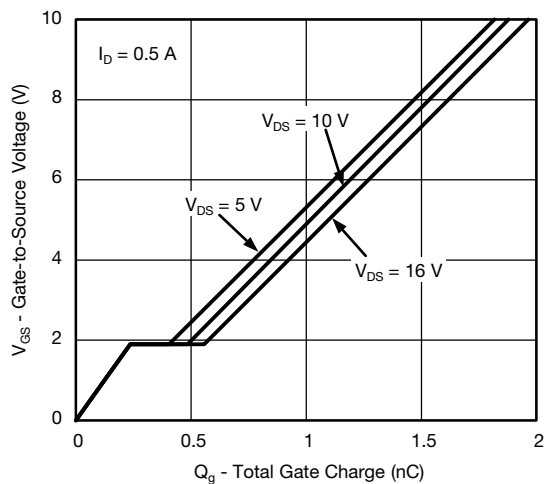
Transfer Characteristics



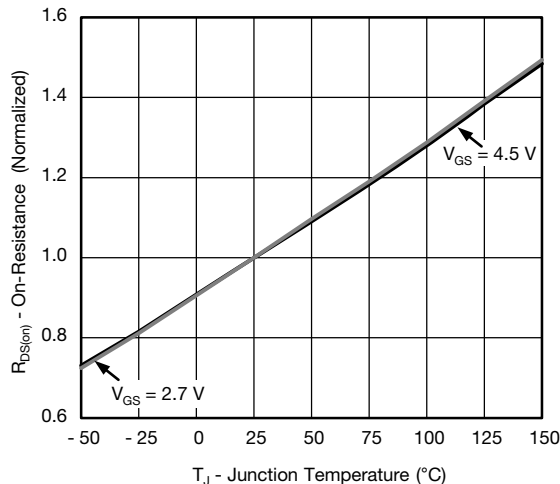
On-Resistance vs. Drain Current and Gate Voltage



Capacitance



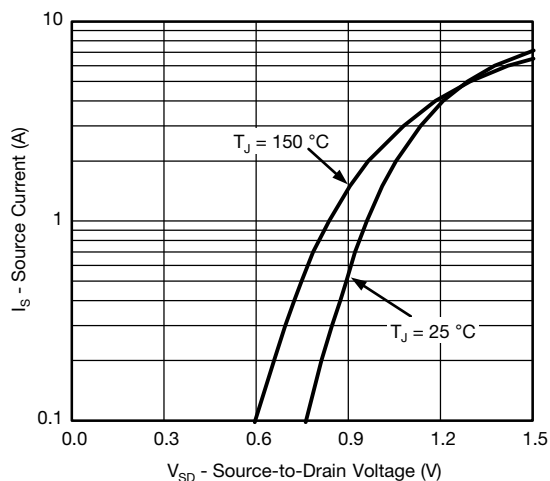
Gate Charge



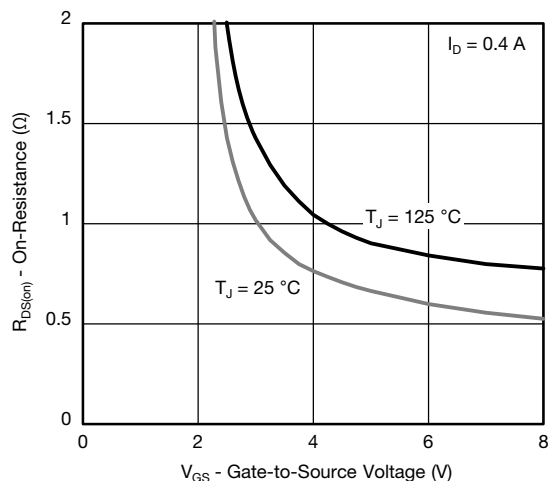
On-Resistance vs. Junction Temperature



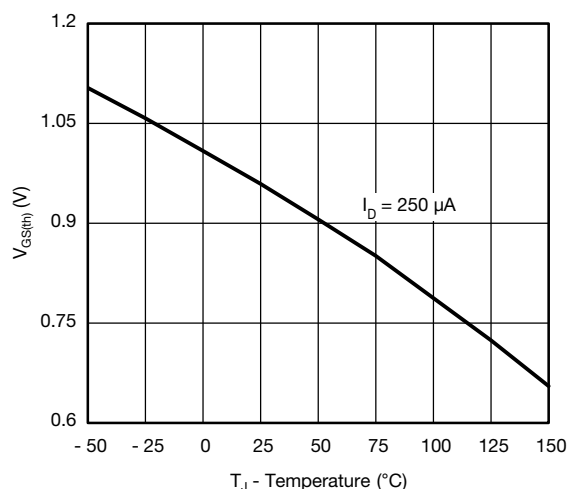
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



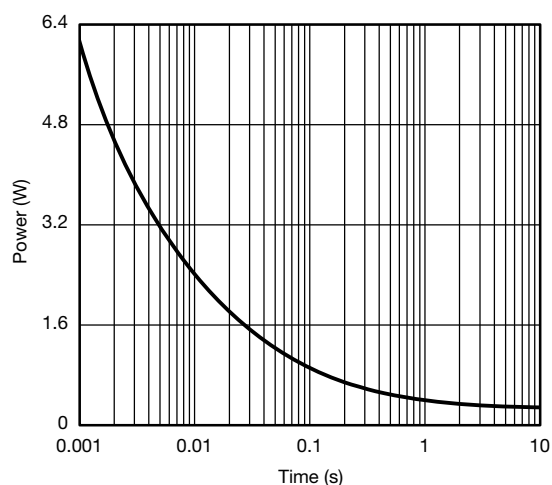
Source-Drain Diode Forward Voltage



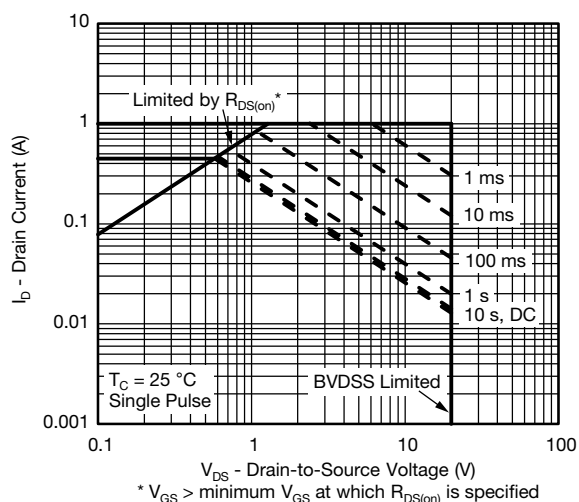
On-Resistance vs. Gate-to-Source Voltage



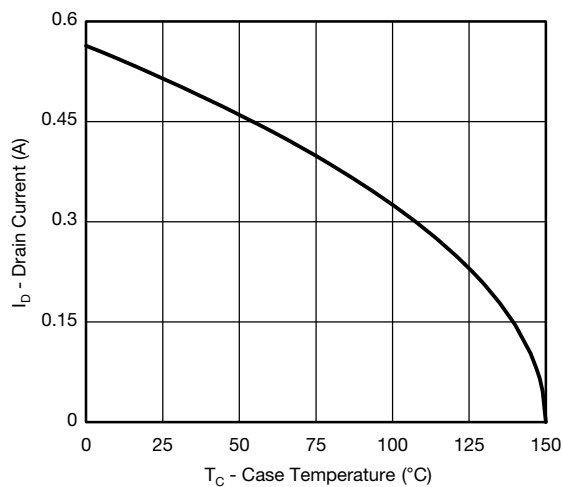
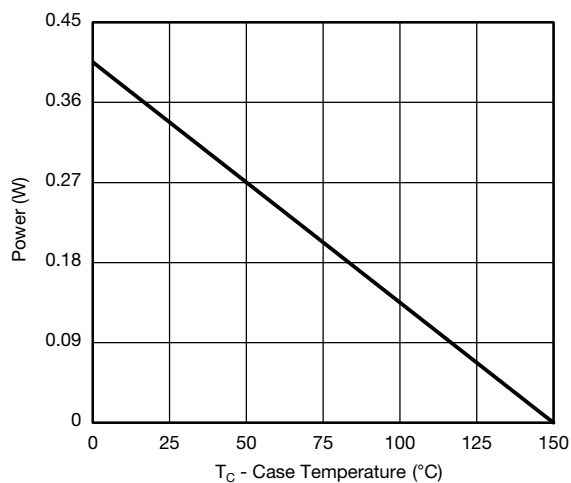
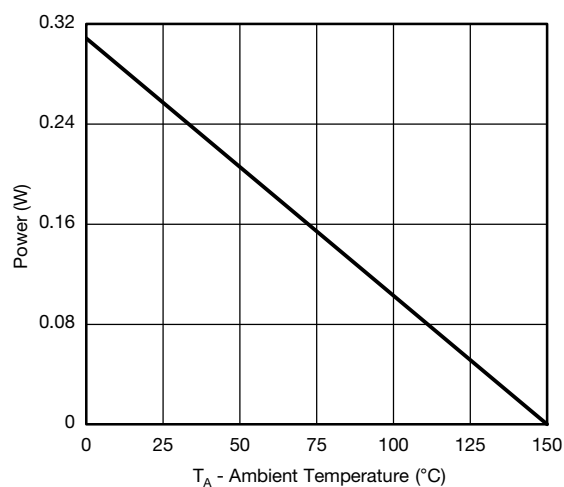
Threshold Voltage



Single Pulse Power, Junction-to-Ambient



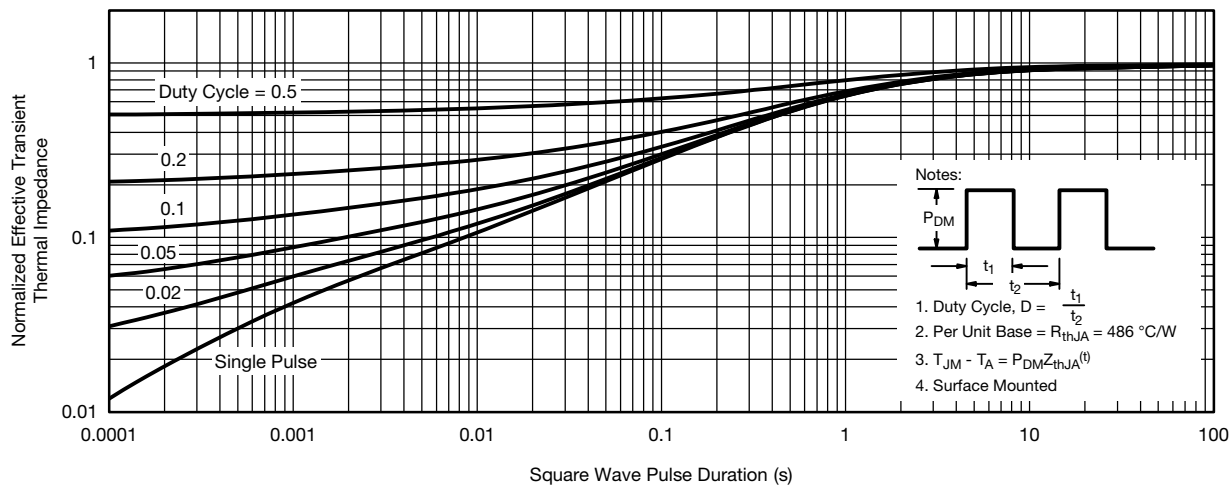
Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Current Derating*

Power Derating, Junction-to-Foot

Power Derating, Junction-to-Ambient

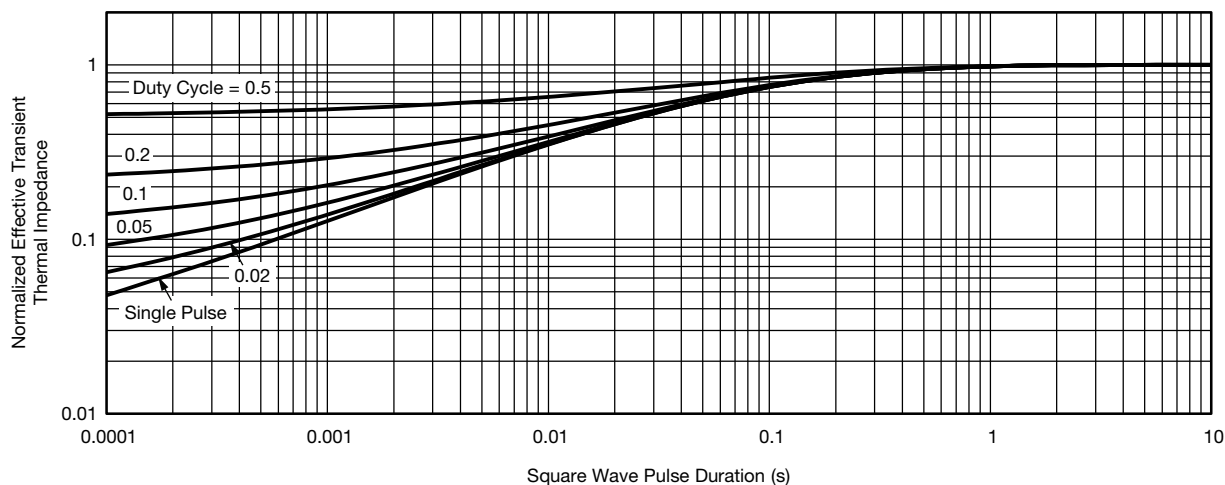
* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

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