

N-Channel 40-V (D-S), 175 °C MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ)
40	0.010 at $V_{GS} = 10$ V	20	30 nC
	0.012 at $V_{GS} = 4.5$ V	20	

FEATURES

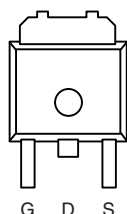
- TrenchFET® Power MOSFET
- 100 % R_g and UIS Tested

APPLICATIONS

- LCD TV Inverter
- Secondary Synchronous Rectification


RoHS
COMPLIANT

TO-252

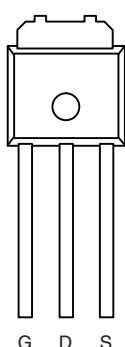


Top View

Order Number:

SUD50N04-10P-E3 (Lead (Pb)-free)

TO-251

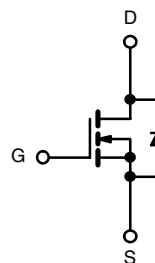


Top View

Order Number:

SUU50N04-10P-E3 (Lead (Pb)-free)

and DRAIN-TAB



N-Channel MOSFET

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 16	
Continuous Drain Current ($T_J = 150$ °C)	$T_C = 25$ °C	20 ^a	A
	$T_C = 100$ °C	20 ^a	
	$T_A = 25$ °C	12.6 ^b	
	$T_A = 100$ °C	8.9 ^b	
Pulsed Drain Current	I_{DM}	100	
Continuous Source-Drain Diode Current	$T_C = 25$ °C	20 ^a	
	$T_A = 25$ °C	2.5 ^b	
Single Pulse Avalanche Current	I_{AS}	30	
Avalanche Energy	E_{AS}	45	mJ
Maximum Power Dissipation	$T_C = 25$ °C	53.5	W
	$T_C = 100$ °C	26.7	
	$T_A = 25$ °C	3.2 ^b	
	$T_A = 100$ °C	1.6 ^b	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^b	R_{thJA}	38	47	°C/W
Maximum Junction-to-Case	R_{thJC}	2	2.8	

Notes:

a. Package limited.

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

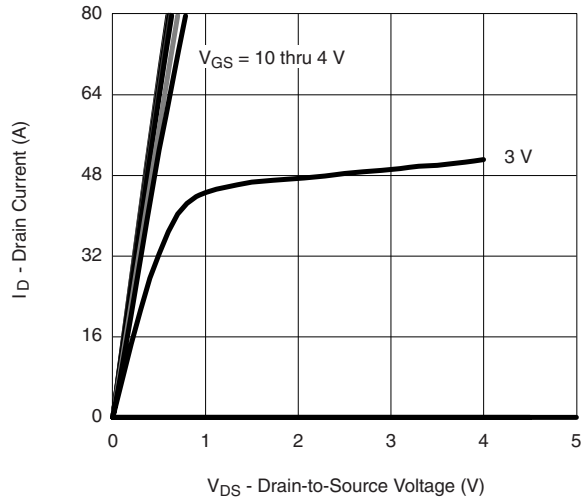
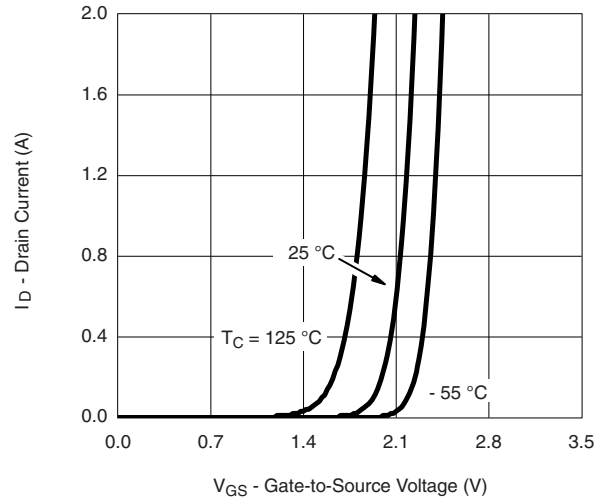
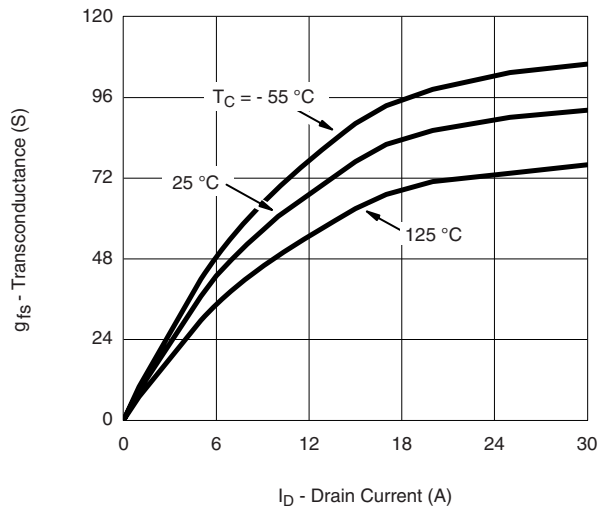
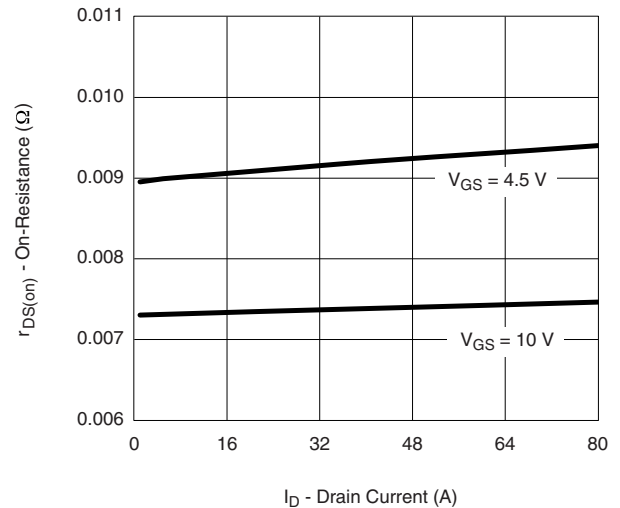
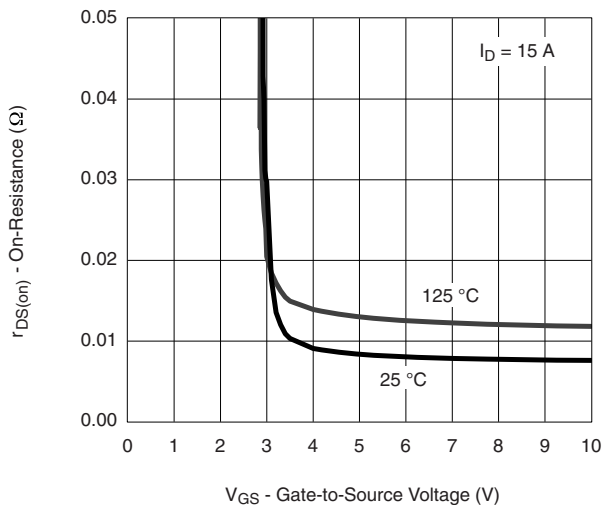
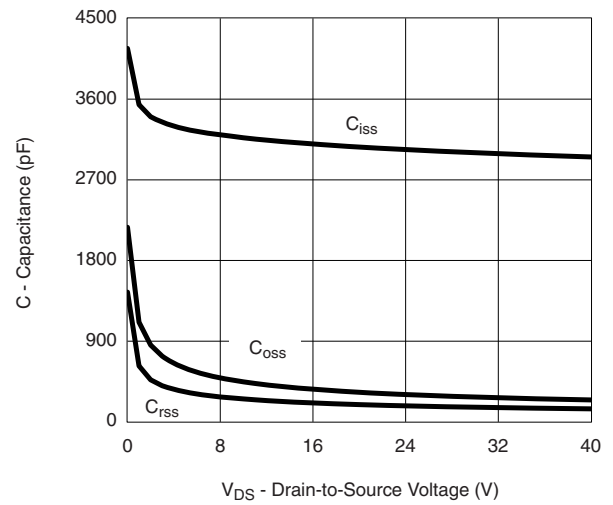
SPECIFICATIONS T _J = 25 °C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	40			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		38		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 6		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	0.8		2.2	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 16 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 40 V, V _{GS} = 0 V			1	μA
		V _{DS} = 40 V, V _{GS} = 0 V, T _J = 100 °C			20	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	30			A
Drain-Source On-State Resistance ^a	r _{DS(on)}	V _{GS} = 10 V, I _D = 15 A		0.0075	0.01	Ω
		V _{GS} = 4.5 V, I _D = 10 A		0.009	0.012	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 15 A		77		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = 20 V, V _{GS} = 0 V, f = 1 MHz		3050		pF
Output Capacitance	C _{oss}			330		
Reverse Transfer Capacitance	C _{rss}			190		
Total Gate Charge	Q _g	V _{DS} = 20 V, V _{GS} = 10 V, I _D = 30 A		64	100	nC
		V _{DS} = 20 V, V _{GS} = 4.5 V, I _D = 30 A		30	45	
Gate-Source Charge	Q _{gs}			7.7		
Gate-Drain Charge	Q _{gd}			10.8		
Gate Resistance	R _g	f = 1 MHz		1.1	1.7	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = 20 V, R _L = 0.66 Ω I _D ≡ 30 A, V _{GEN} = 4.5 V, R _g = 1 Ω		20	30	ns
Rise Time	t _r			130	200	
Turn-Off Delay Time	t _{d(off)}			56	85	
Fall Time	t _f			35	53	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 20 V, R _L = 0.66 Ω I _D ≡ 30 A, V _{GEN} = 10 V, R _g = 1 Ω		7	14	
Rise Time	t _r			18	30	
Turn-Off Delay Time	t _{d(off)}			28	45	
Fall Time	t _f			8	16	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			20	A
Pulse Diode Forward Current ^a	I _{SM}				50	
Body Diode Voltage	V _{SD}	I _S = 10 A		0.81	1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 20 A, di/dt = 100 A/μs, T _J = 25 °C		22	35	ns
Body Diode Reverse Recovery Charge	Q _{rr}			26	41	nC
Reverse Recovery Fall Time	t _a			17		ns
Reverse Recovery Rise Time	t _b			9		

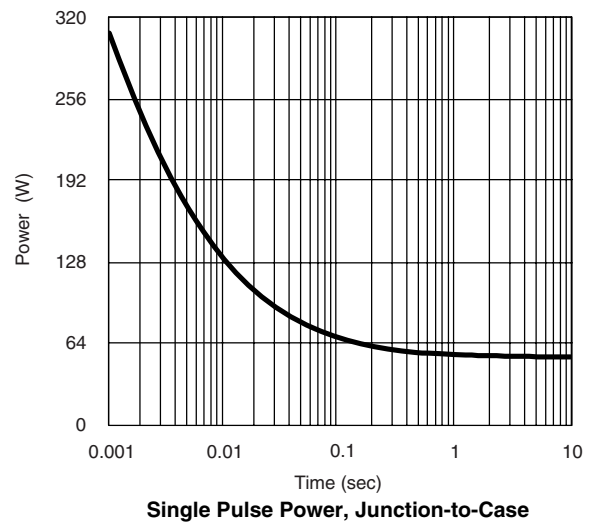
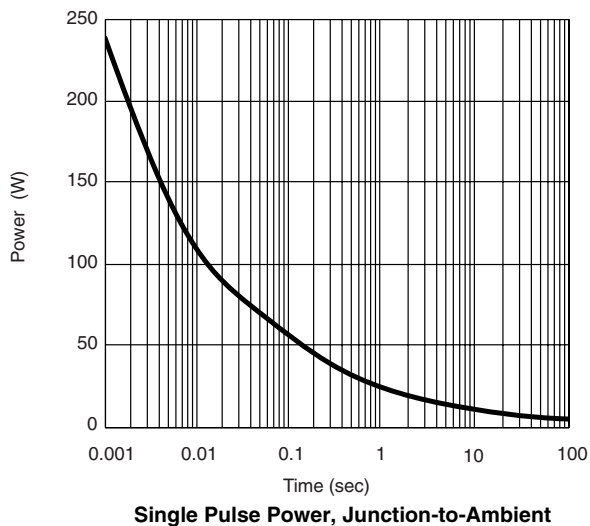
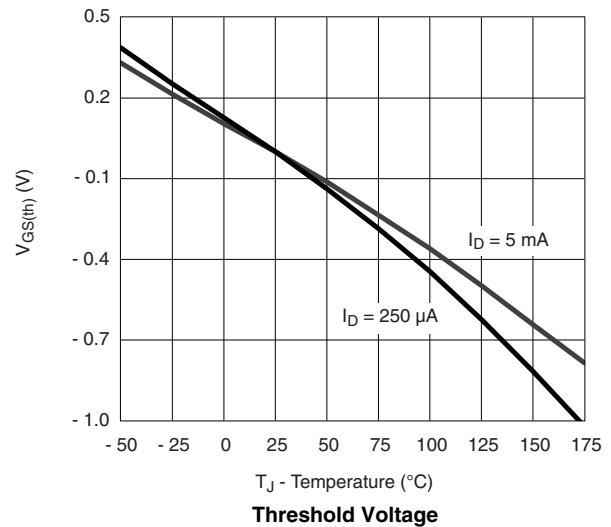
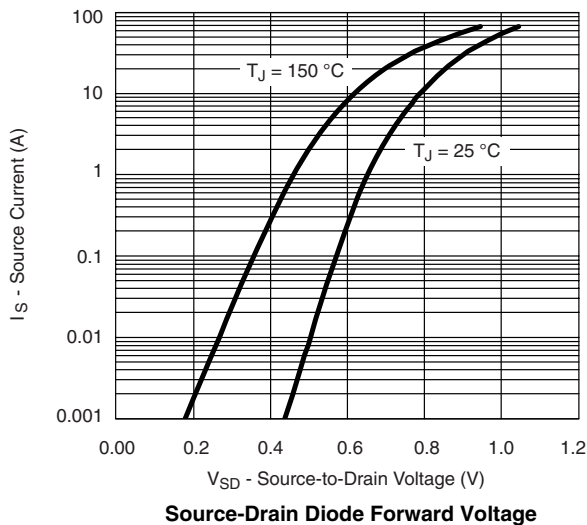
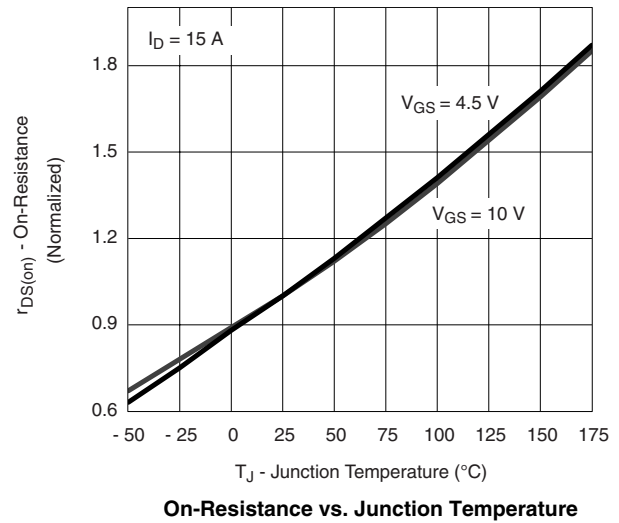
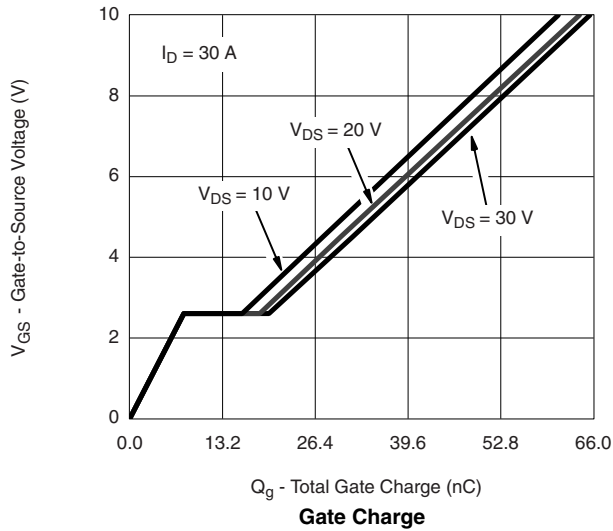
Notes:

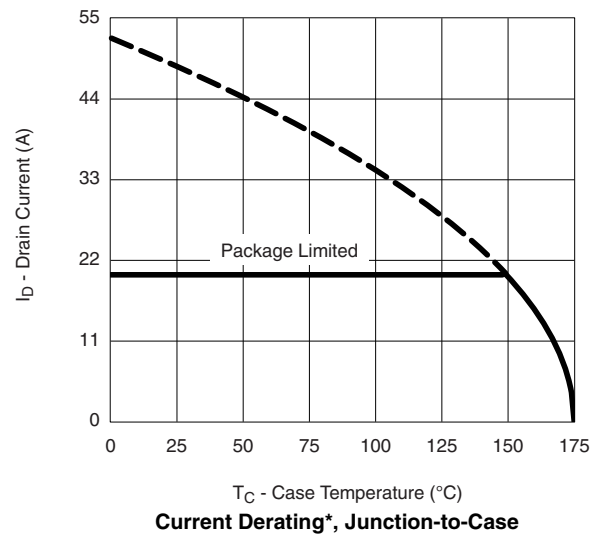
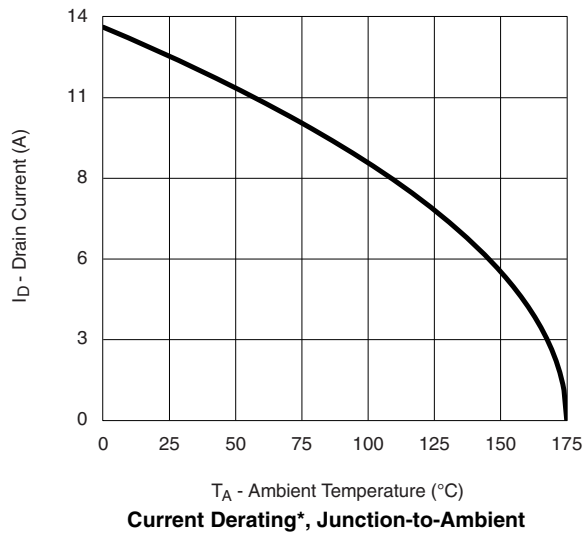
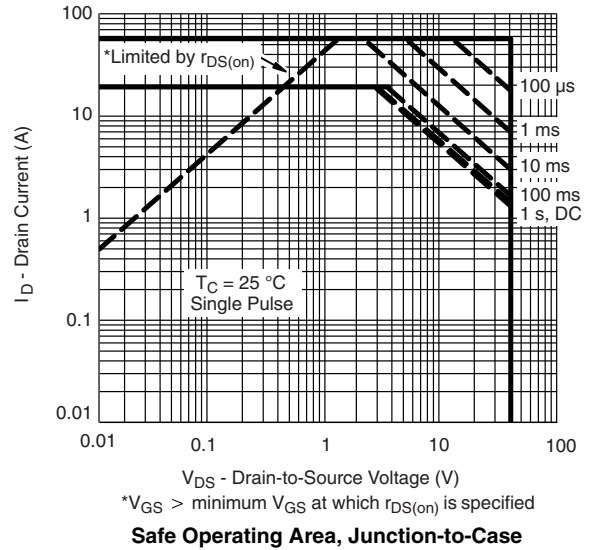
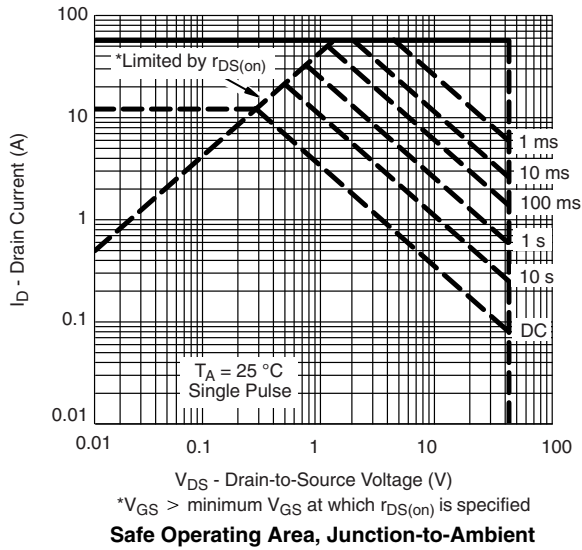
a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

b. Guaranteed by design, not subject to production testing.

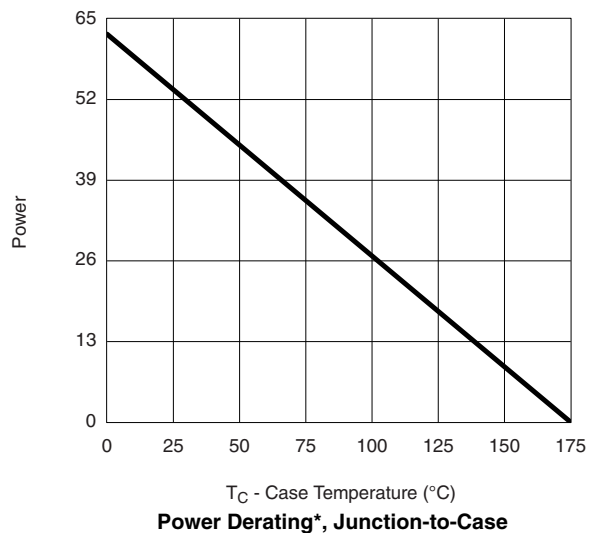
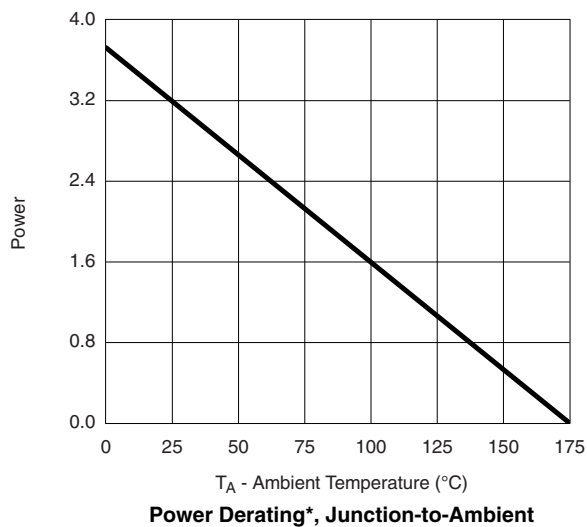
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted**Output Characteristics****Transfer Characteristics****Transconductance****On-Resistance vs. Drain Current****On-Resistance vs. Gate-to-Source Voltage****Capacitance**

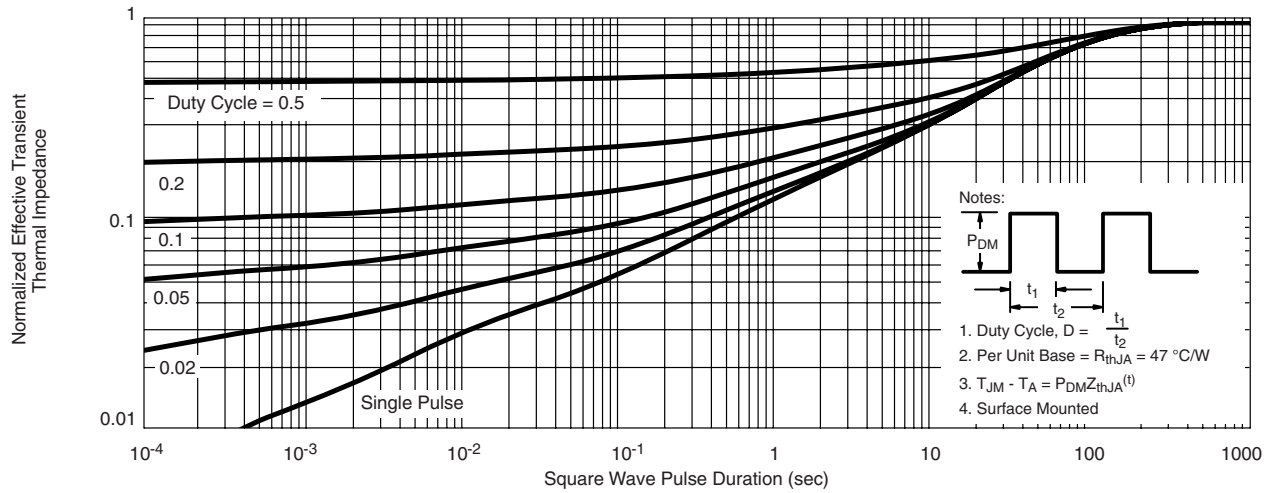
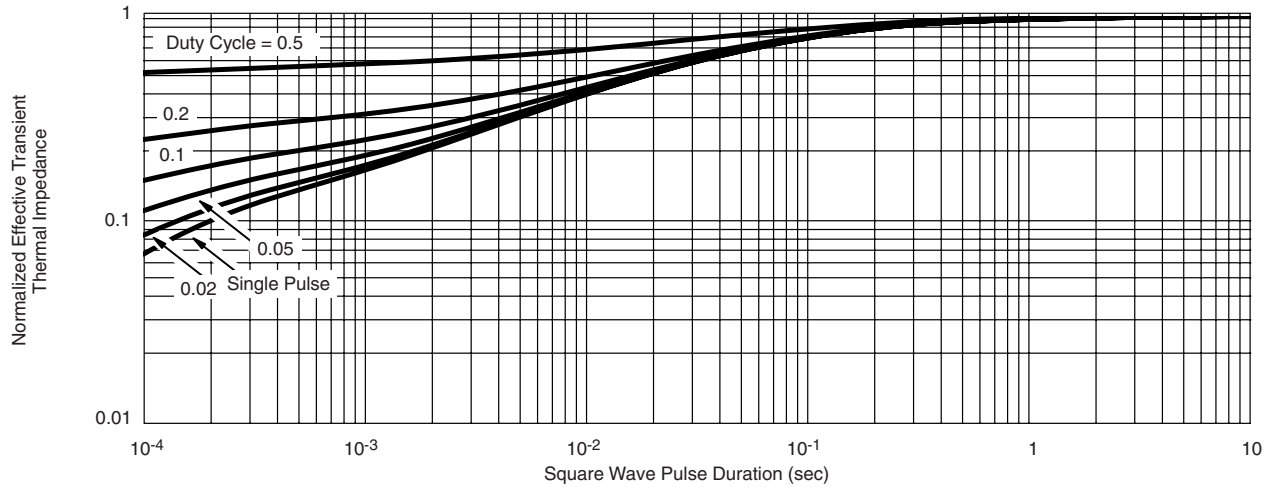
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

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

Vishay Siliconix

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

*The power dissipation P_D is based on $T_{J(max)} = 175$ °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-Case**

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?74484>.



Notice

Specifications of the products displayed herein are subject to change without notice. Vishay Intertechnology, Inc., or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Vishay's terms and conditions of sale for such products, Vishay assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of Vishay products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Vishay for any damages resulting from such improper use or sale.