

HM40N10KA-VB Datasheet N-Channel 100-V (D-S) MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g (Typ.)
100	0.0185 at V _{GS} = 10 V	45	38 nC

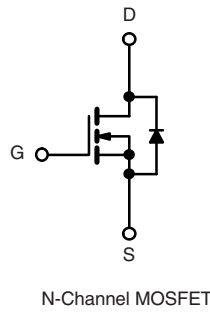
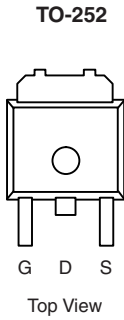
FEATURES

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



APPLICATIONS

- Primary Side Switch
- Isolated DC/DC Converter



ABSOLUTE MAXIMUM RATINGS (T _A = 25 °C, unless otherwise noted)				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V _{DS}	100	V	
Gate-Source Voltage	V _{GS}	± 20		
Continuous Drain Current (T _J = 150 °C)	I _D	T _C = 25 °C	45 ^a	A
		T _C = 100 °C	30	
		T _A = 25 °C	9.2 ^b	
		T _A = 100 °C	6.8 ^b	
Pulsed Drain Current	I _{DM}	140		
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	45 ^a	
		T _A = 25 °C	2 ^b	
Single Pulse Avalanche Current	I _{AS}	35		
Avalanche Energy	E _{AS}	101	mJ	
Maximum Power Dissipation	P _D	T _C = 25 °C	136.4	W
		T _C = 100 °C	68.2	
		T _A = 25 °C	3 ^b	
		T _A = 100 °C	1.5 ^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}	40	50	Steady State	°C/W
Maximum Junction-to-Case					

Notes:

a. Package limited.

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

SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	100			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		110		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$		-12.5			
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.5		5	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			50	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	30			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 15\text{ A}$		0.0185		Ω
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 15\text{ A}$		33		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		2400		pF
Output Capacitance	C_{oss}		230			
Reverse Transfer Capacitance	C_{rss}		80			
Total Gate Charge	Q_g	$V_{DS} = 50\text{ V}, V_{GS} = 10\text{ V}, I_D = 50\text{ A}$		38	70	nC
Gate-Source Charge	Q_{gs}		14			
Gate-Drain Charge	Q_{gd}		12			
Gate Resistance	R_g		$f = 1\text{ MHz}$	1.6	2.5	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 50\text{ V}, R_L = 1\text{ }\Omega$ $I_D \cong 50\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		12	20	ns
Rise Time	t_r		10	20		
Turn-Off Delay Time	$t_{d(off)}$		18	35		
Fall Time	t_f		8	15		
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode	I_S	$T_C = 25\text{ }^\circ\text{C}$			35	A
Pulse Diode Forward Current ^a	I_{SM}				100	
Body Diode Voltage	V_{SD}	$I_S = 15\text{ A}$		0.85	1.5	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 50\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		80	120	ns
Body Diode Reverse Recovery Charge	Q_{rr}		160	240	nC	
Reverse Recovery Fall Time	t_a		57		ns	
Reverse Recovery Rise Time	t_b		23			

Notes:

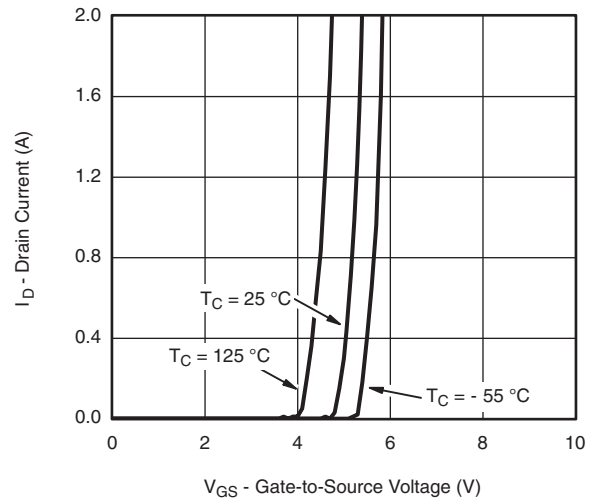
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.

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.

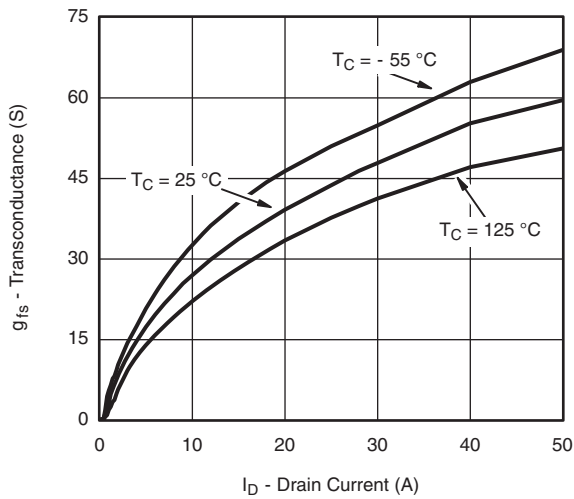
TYPICAL CHARACTERISTICS (25 °C, unless otherwise note)



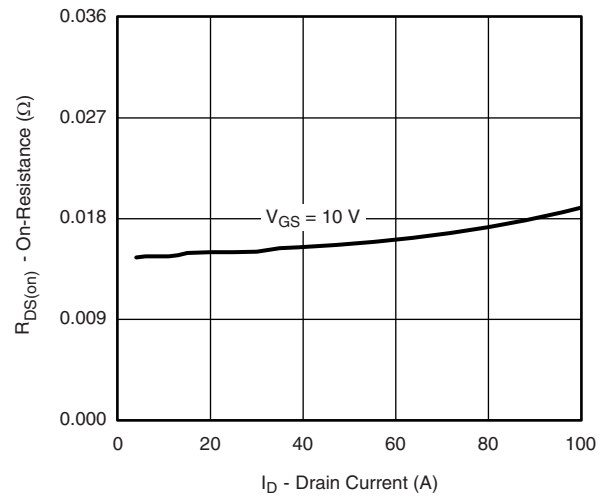
Output Characteristics



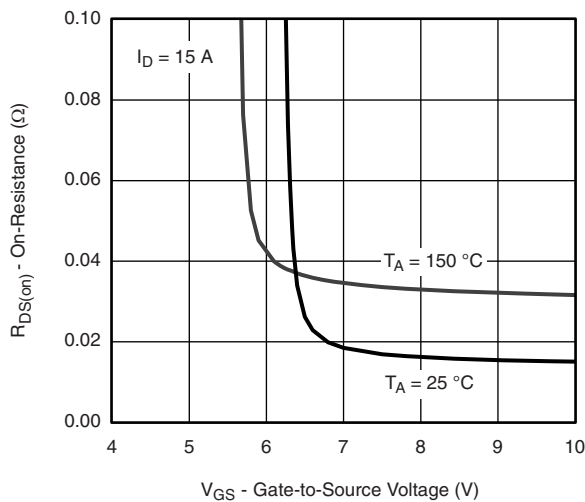
Transfer Characteristics



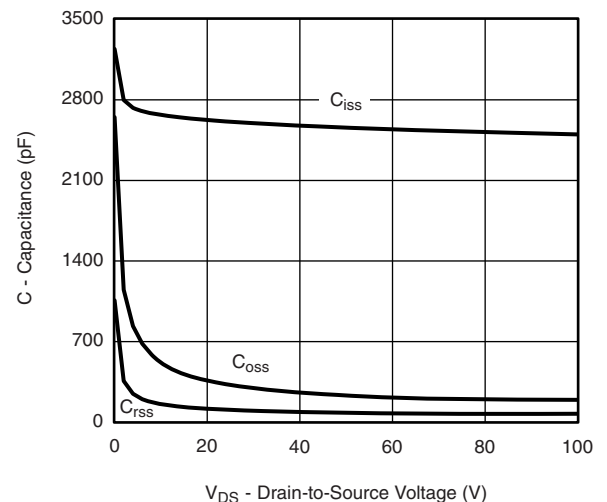
Transconductance



On-Resistance vs. Drain Current

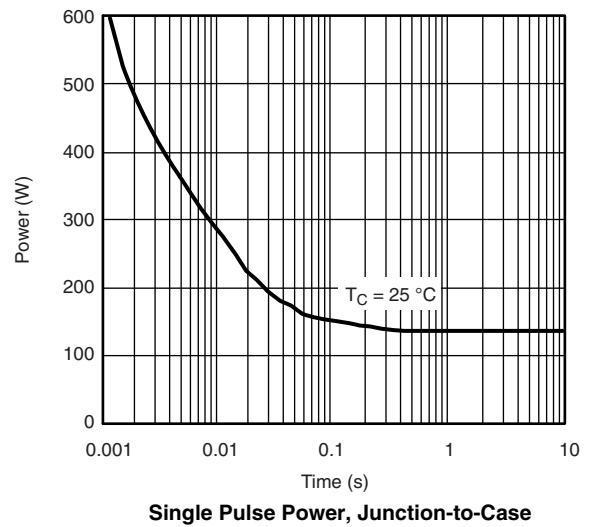
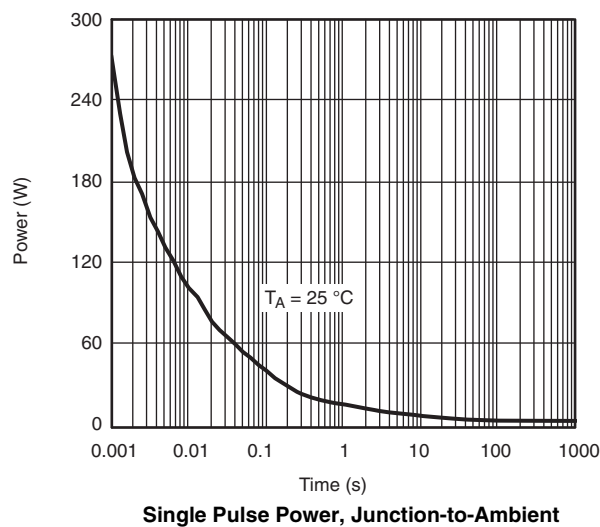
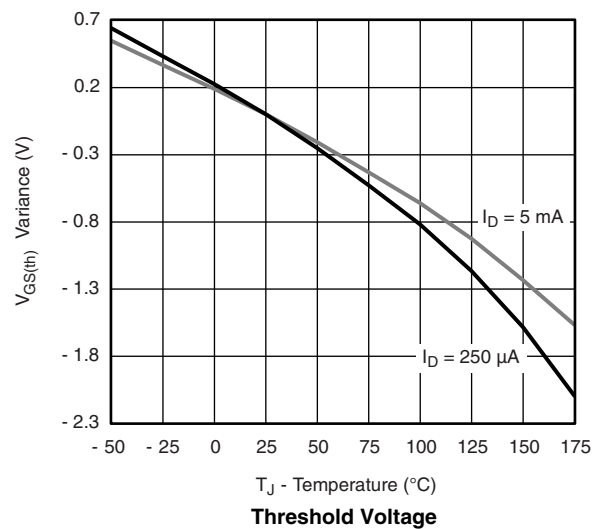
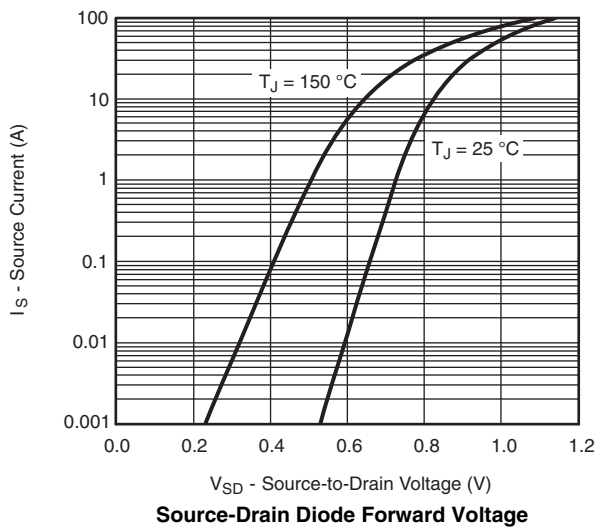
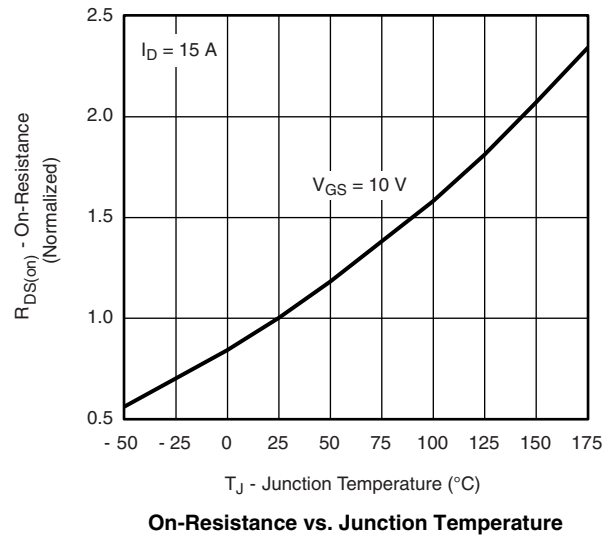
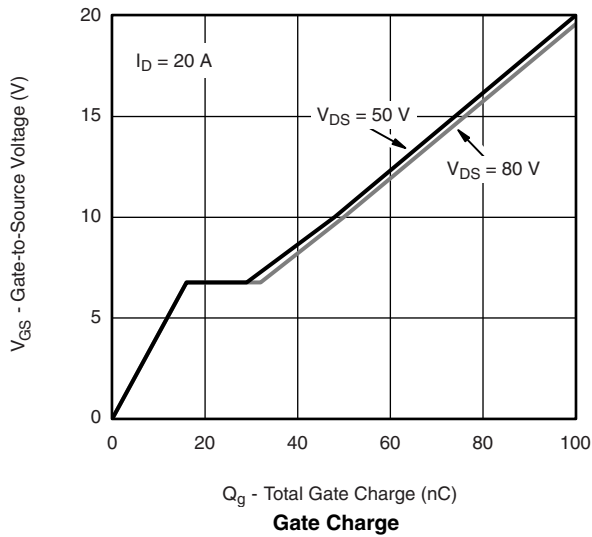


On-Resistance vs. Gate-to-Source Voltage

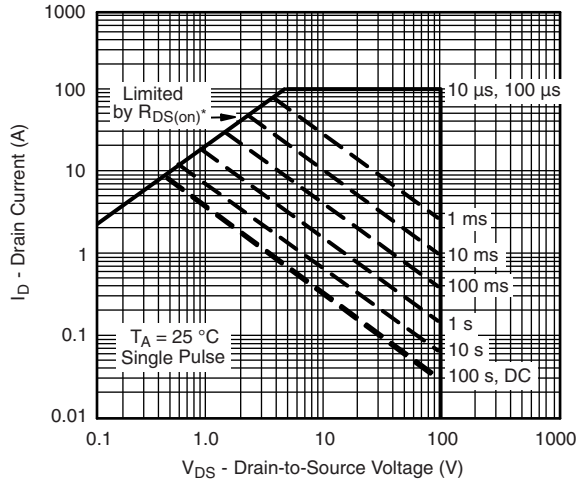


Capacitance

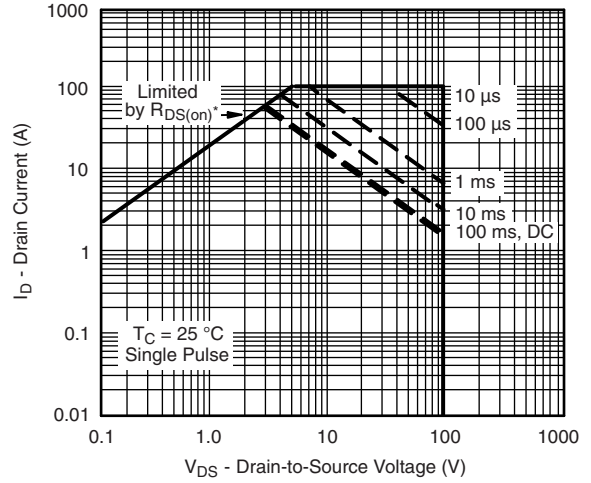
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



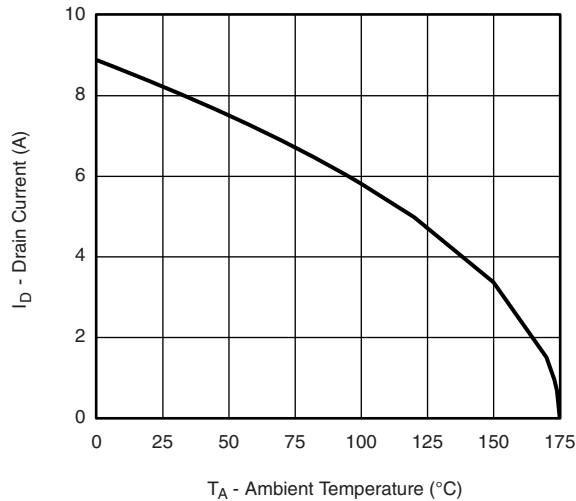
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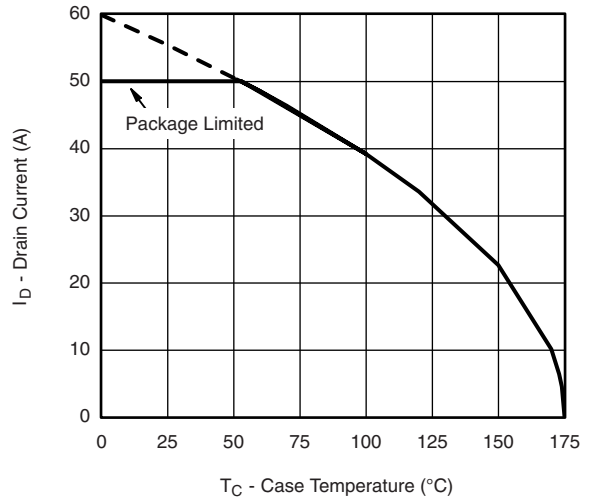
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified
Safe Operating Area, Junction-to-Ambient



* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified
Safe Operating Area, Junction-to-Case



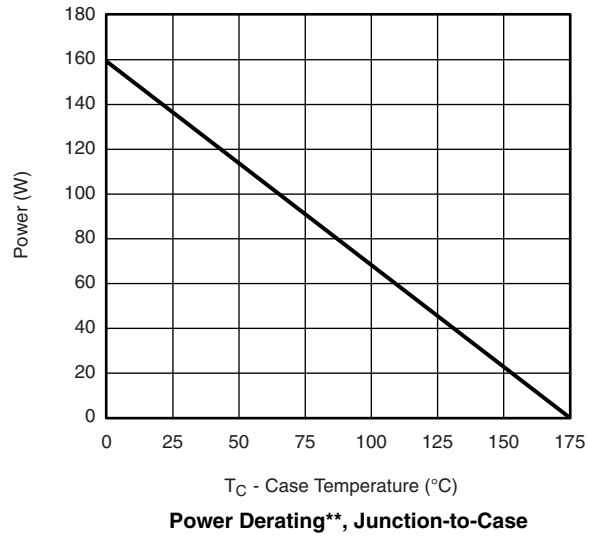
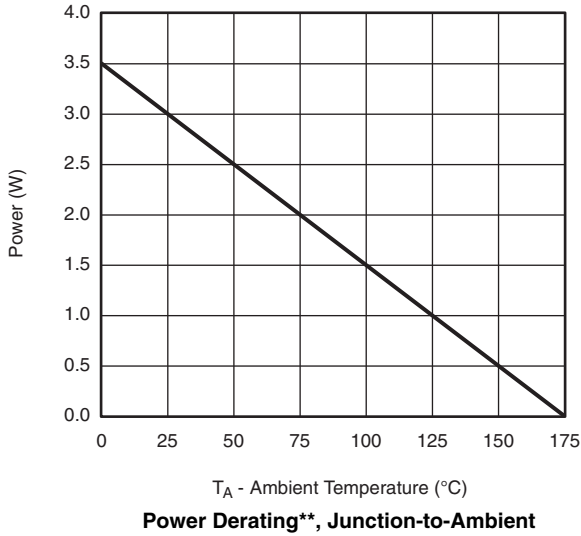
Current Derating, Junction-to-Ambient**



Current Derating, Junction-to-Case**

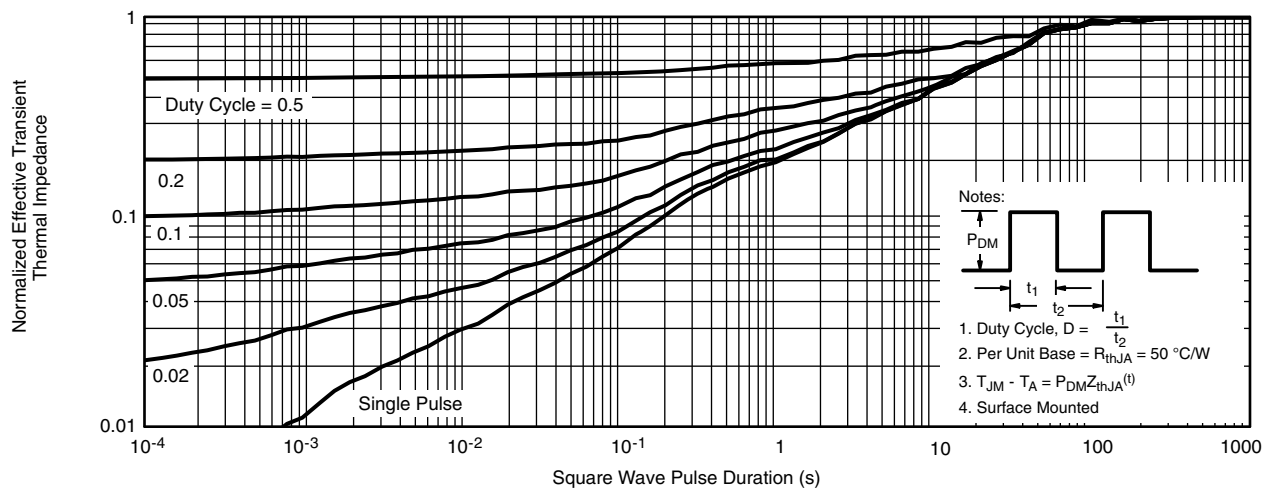
** The power dissipation P_D is based on $T_{J(max.)} = 175$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

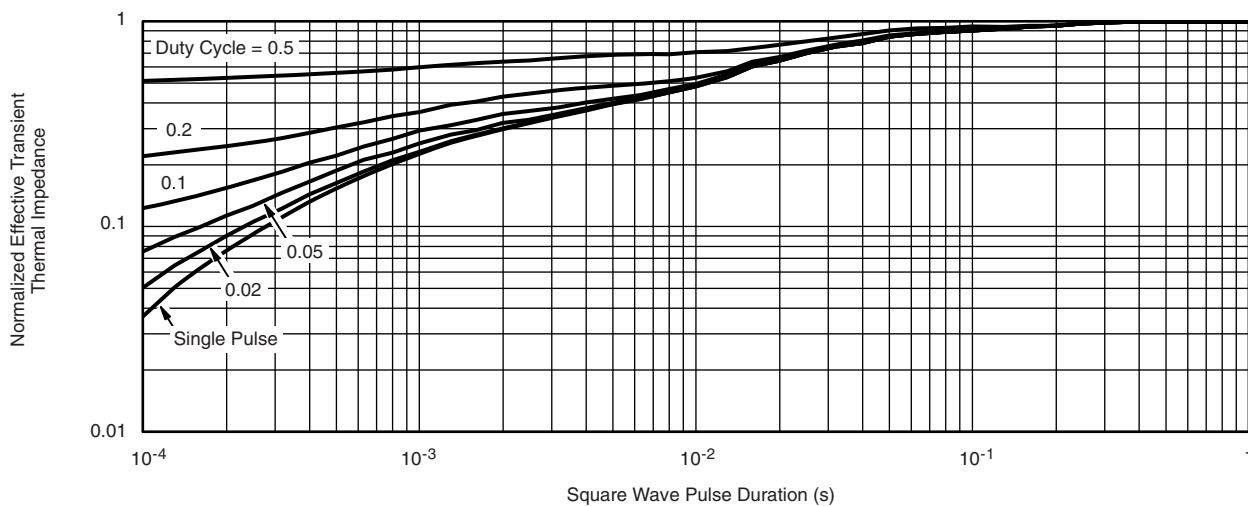


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TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

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