

ZVN3310A-VB Datasheet

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

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ.)
20	0.0186 at $V_{GS} = 10$ V	4.8	7.9 nC
	0.021 at $V_{GS} = 4.5$ V	4.8	
	0.025 at $V_{GS} = 2.5$ V	4.5	

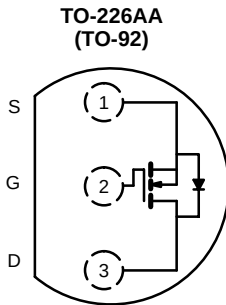
FEATURES

- Halogen-free
- Trench Power MOSFET
- New Thermally Enhanced SC-70 Package
 - Small Footprint Area
 - Low On-Resistance
- 100 % R_g Tested

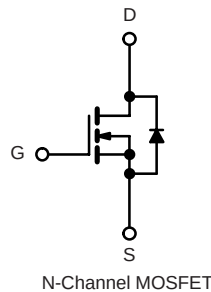

RoHS
 COMPLIANT

APPLICATIONS

- Load Switch



Top View



ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 12	
Continuous Drain Current ($T_J = 150^\circ\text{C}$) ^a	$T_C = 25^\circ\text{C}$	4.8 ^a	A
	$T_C = 70^\circ\text{C}$	4.5 ^a	
	$T_A = 25^\circ\text{C}$	4.8 ^{a, b, c}	
	$T_A = 70^\circ\text{C}$	4.5 ^{a, b, c}	
Pulsed Drain Current	I_{DM}	20	A
Continuous Source-Drain Diode Current	$T_C = 25^\circ\text{C}$	4.5 ^a	
	$T_A = 25^\circ\text{C}$	2.9 ^{b, c}	
Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	1.9	W
	$T_C = 70^\circ\text{C}$	1.2	
	$T_A = 25^\circ\text{C}$	0.5 ^{b, c}	
	$T_A = 70^\circ\text{C}$	0.2 ^{b, c}	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	$^\circ\text{C}$
Soldering Recommendations (Peak Temperature)		260	

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient	R_{thJA}	28	36	$^\circ\text{C/W}$
Maximum Junction-to-Case (Drain)	R_{thJC}	5.3	6.5	

Notes:

- a. Package limited
 b. Surface Mounted on 1" x 1" FR4 board.
 c. $t = 5$ s.

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	20			V	
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		25		mV/°C	
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 3.7			
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	0.6		1.5	V	
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 12 V			± 100	nA	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V			1	μA	
		V _{DS} = 20 V, V _{GS} = 0 V, T _J = 55 °C			10		
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≤ 5 V, V _{GS} = 4.5 V		20		A	
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 4.8 A		0.0186		Ω	
		V _{GS} = 4.5 V, I _D = 4.8 A		0.021			
		V _{GS} = 2.5 V, I _D = 4.8 A		0.025			
Forward Transconductance ^a	g _{fs}	V _{DS} = 10 V, I _D = 4.8 A		20		S	
Dynamic ^b							
Input Capacitance	C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz		1020		pF	
Output Capacitance	C _{oss}			160			
Reverse Transfer Capacitance	C _{rss}			70			
Total Gate Charge	Q _g	V _{DS} = 10 V, V _{GS} = 10 V, I _D = 4.8 A		17.5	27	nC	
Gate-Source Charge	Q _{gs}	V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 4.8 A		7.9	16		
Gate-Drain Charge	Q _{gd}			2.1			
Gate Resistance	R _g			1.1			
Turn-On Delay Time	t _{d(on)}	f = 1 MHz	0.6	3	6	Ω	
Rise Time	t _r		V _{DD} = 10 V, R _L = 1.3 Ω I _D ≅ 3.9 A, V _{GEN} = 4.5 V, R _g = 1 Ω		12	18	ns
Turn-Off Delay Time	t _{d(off)}				11	17	
Fall Time	t _f				27	41	
Turn-On Delay Time	t _{d(on)}			11	17		
Rise Time	t _r	V _{DD} = 10 V, R _L = 1.3 Ω I _D ≅ 3.9 A, V _{GEN} = 10 V, R _g = 1 Ω		7	14		
Turn-Off Delay Time	t _{d(off)}			10	15		
Fall Time	t _f			20	30		
				8	16		
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			4.5 ^c	A	
Pulse Diode Forward Current	I _{SM}				20		
Body Diode Voltage	V _{SD}	I _S = 3.9 A, V _{GS} = 0 V		0.8	1.2	V	
Body Diode Reverse Recovery Time	t _{rr}	I _F = 7.9 A, dI/dt = 100 A/μs, T _J = 25 °C		16	24	ns	
Body Diode Reverse Recovery Charge	Q _{rr}			6	12	nC	
Reverse Recovery Fall Time	t _a			7		ns	
Reverse Recovery Rise Time	t _b			8			

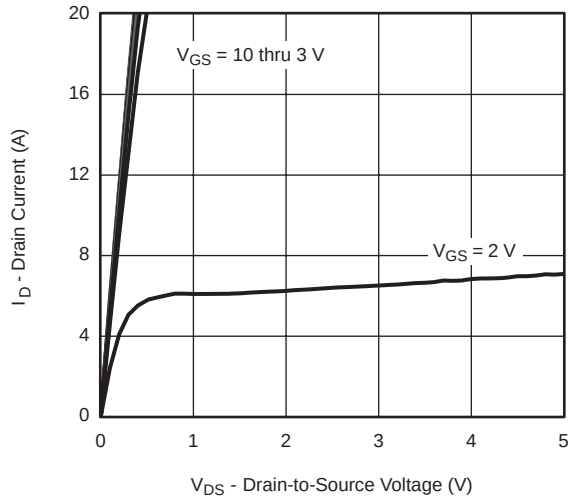
Notes:

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

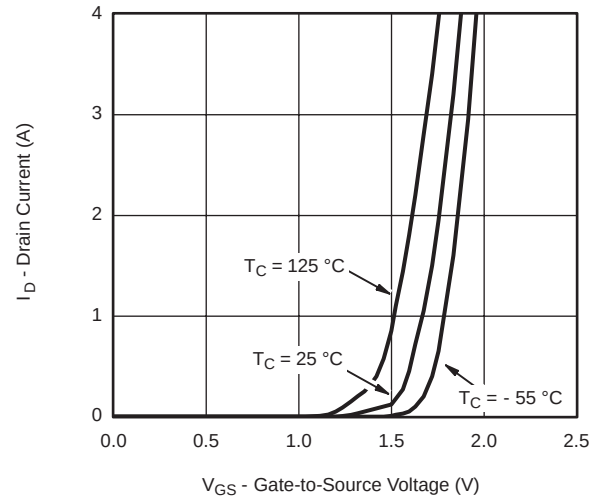
b. Guaranteed by design, not subject to production testing.

c. Package Limited

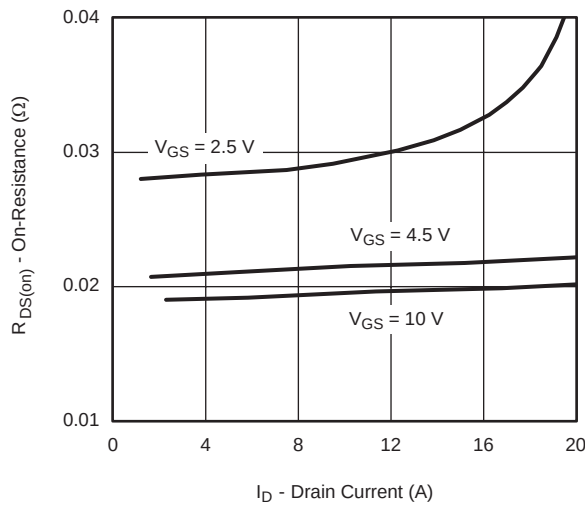
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



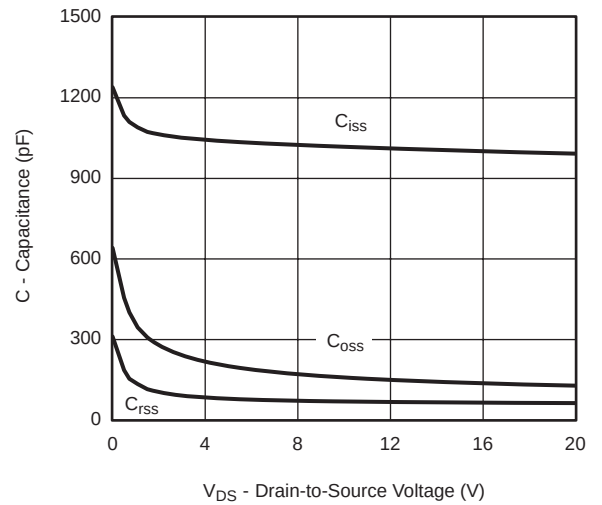
Output Characteristics



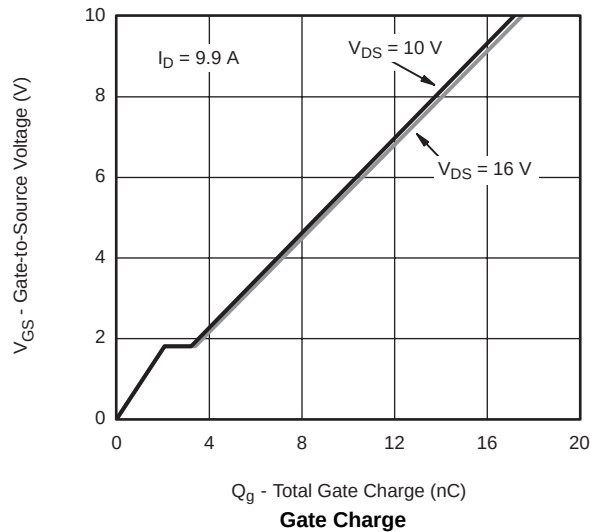
Transfer Characteristics



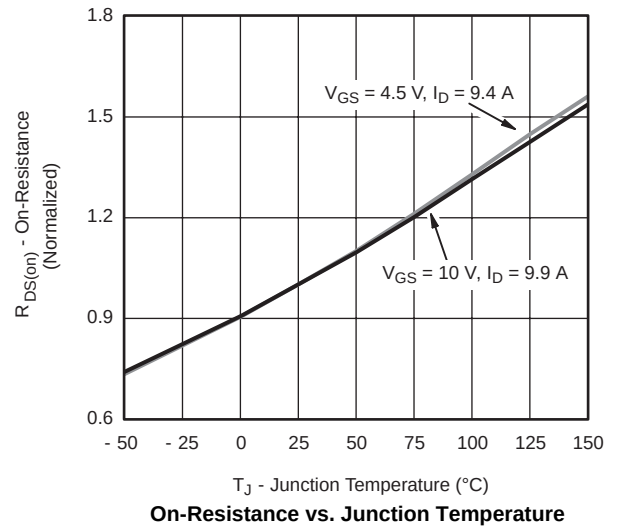
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

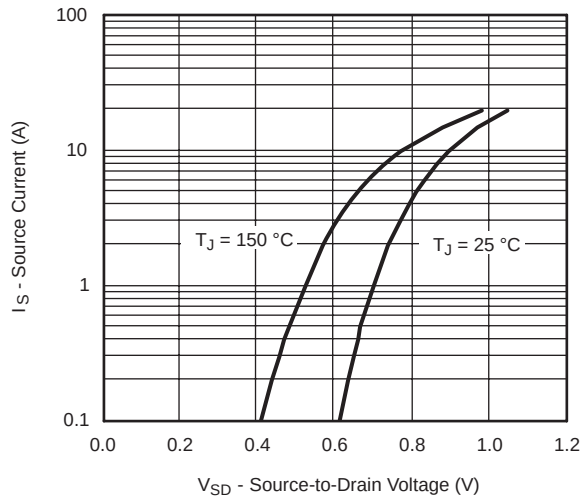


Gate Charge

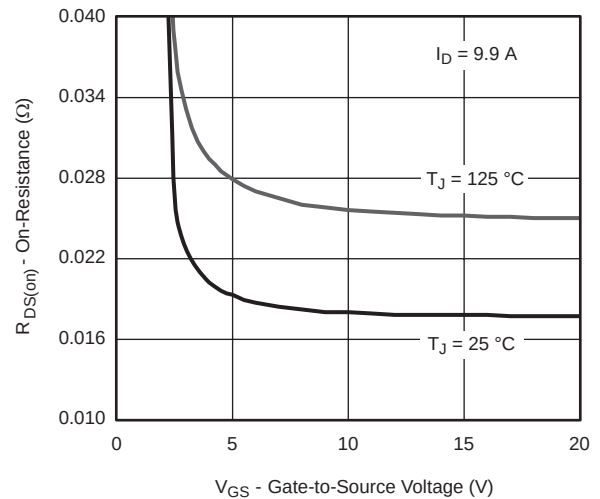


On-Resistance vs. Junction Temperature

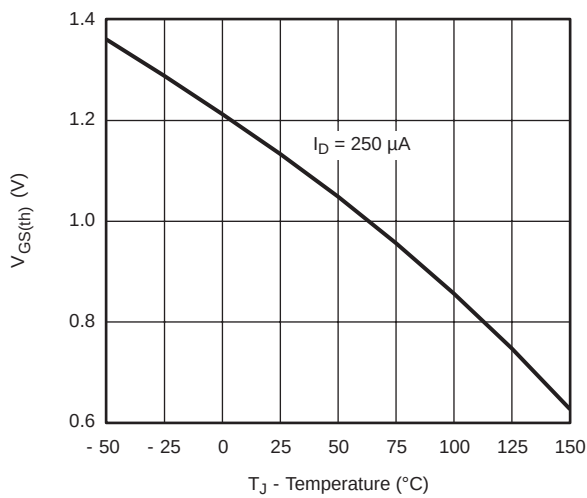
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



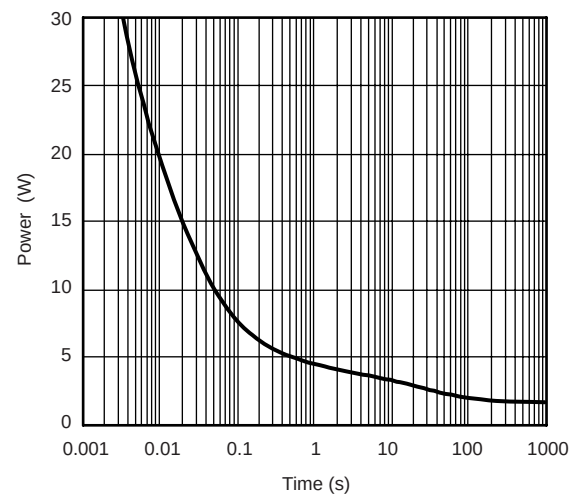
Source-Drain Diode Forward Voltage



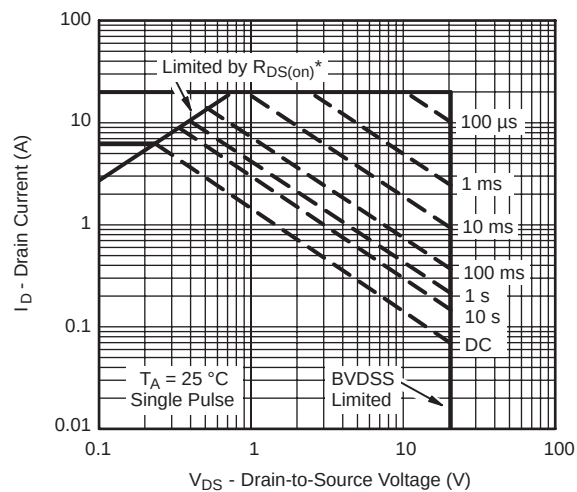
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



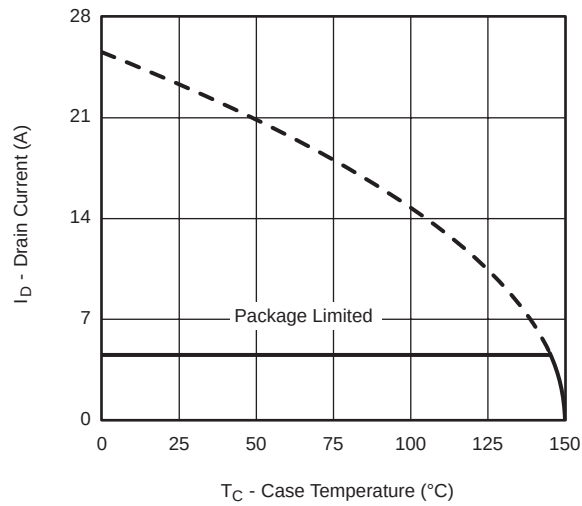
Single Pulse Power, Junction-to-Ambient



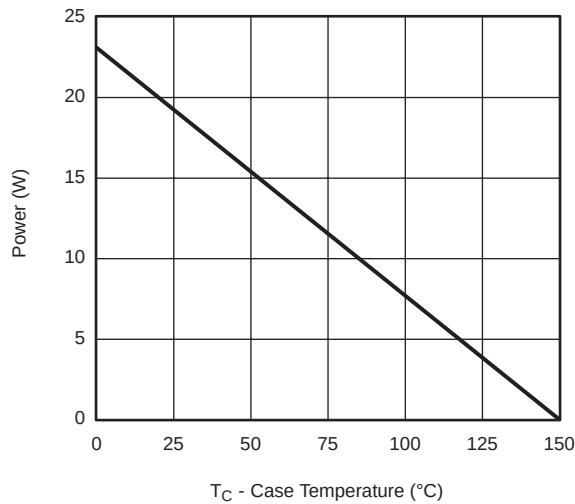
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

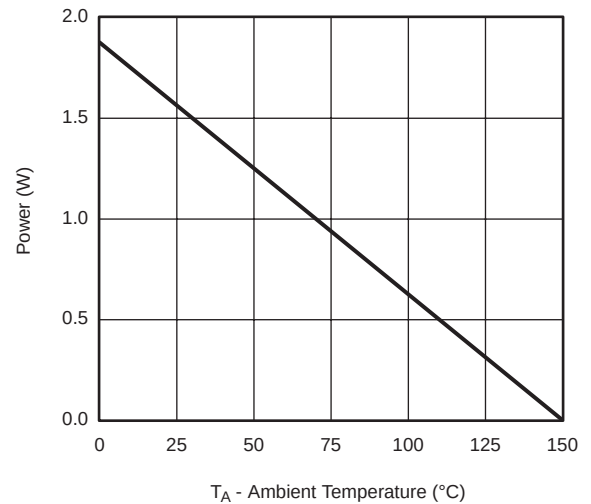
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Current Derating*

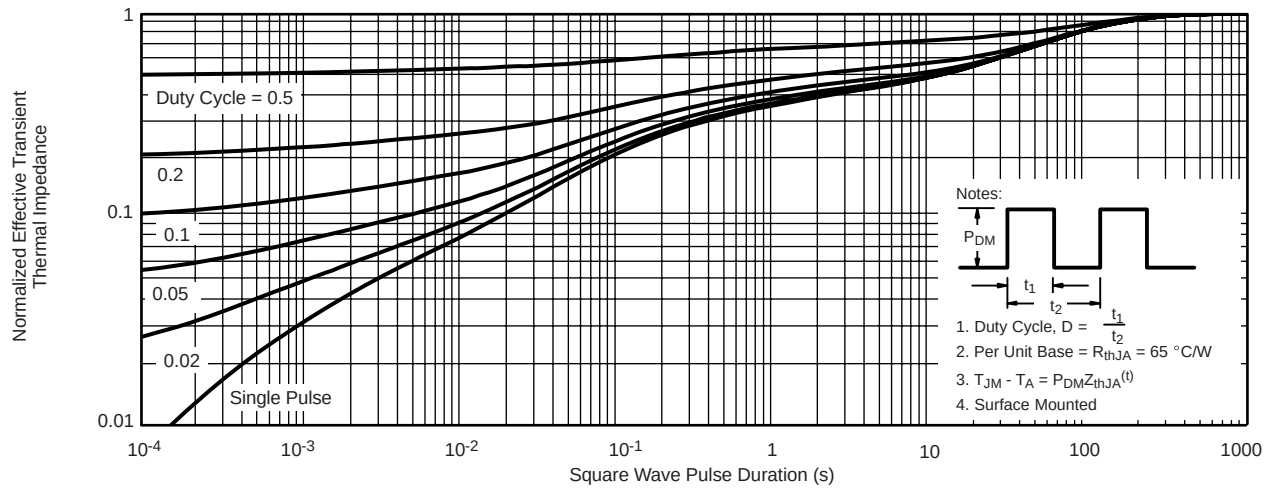
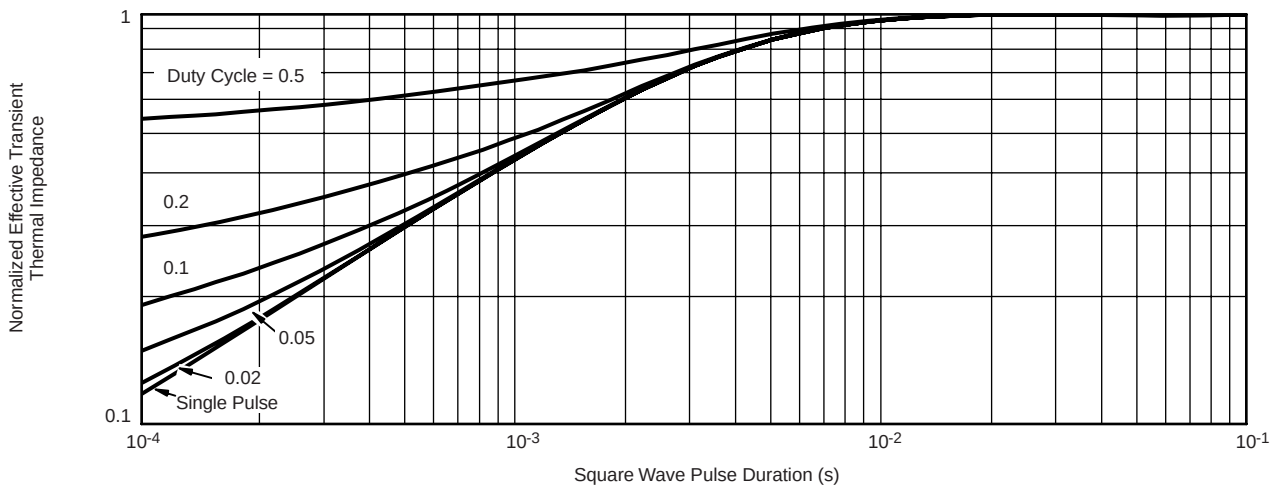


Power, Junction-to-Case



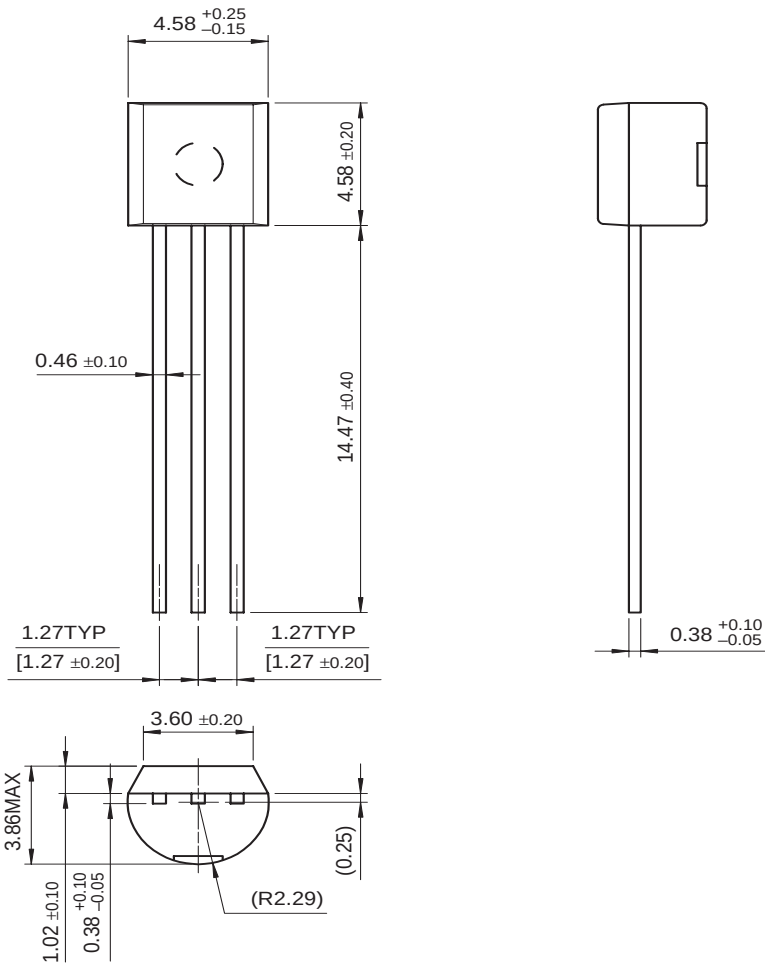
Power, Junction-to-Ambient

* 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-Case

Mechanical Dimensions

TO-92



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