

AP9435GK-HF-VB Datasheet

P-Channel 35 V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^d	Q_g (Typ.)
- 35	0.040 at $V_{GS} = - 10$ V	- 6.2	9.8 nC
	0.048 at $V_{GS} = - 4.5$ V	- 5.1	

FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- Trench Power MOSFET
- 100 % R_g Tested
- 100 % UIS Tested
- Compliant to RoHS Directive 2002/95/EC

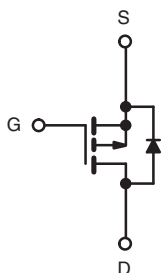
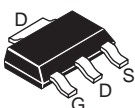


RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Load Switches, Adaptor Switch
- Notebook PCs

SOT-223



P-Channel MOSFET

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

Parameter		Symbol	Limit	Unit	
Drain-Source Voltage		V _{DS}	- 35	V	
Gate-Source Voltage		V _{GS}	± 20		
Continuous Drain Current (T _J = 150 °C)	T _C = 25 °C	I _D	- 6.2	A	
	T _C = 70 °C		- 4.8		
	T _A = 25 °C		- 4.5 ^{a, b}		
	T _A = 70 °C		- 3.4 ^{a, b}		
Pulsed Drain Current		I _{DM}	- 20		
Continuous Source-Drain Diode Current	T _C = 25 °C	I _S	- 3.5		
	T _A = 25 °C		- 2.1 ^{a, b}		
Avalanche Current	L = 0.1 mH	I _{AS}	- 10		
Single-Pulse Avalanche Energy		E _{AS}	5	mJ	
Maximum Power Dissipation	T _C = 25 °C	P _D	4.2	W	
	T _C = 70 °C		2.7		
	T _A = 25 °C		2.5 ^{a, b}		
	T _A = 70 °C		1.6 ^{a, b}		
Operating Junction and Storage Temperature Range		T _J , T _{stg}	- 55 to 150	°C	

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{a, c}	R_{thJA}	40	50	°C/W
Maximum Junction-to-Foot	R_{thJF}	24	30	

Notes:

- Surface mounted on 1" x 1" FR4 board.
- $t = 10$ s.
- Maximum under steady state conditions is 85 °C/W.
- Based on $T_C = 25$ °C.

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	- 35			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = - 250 μA		- 42		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			4.6		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 0.6		- 1.8	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = - 35 V, V _{GS} = 0 V			- 1	μA
		V _{DS} = - 35 V, V _{GS} = 0 V, T _J = 55 °C			- 5	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ - 10 V, V _{GS} = - 10 V	- 10			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V, I _D = - 5 A		0.040		Ω
		V _{GS} = - 4.5 V, I _D = - 4 A		0.048		
Forward Transconductance ^a	g _{fs}	V _{DS} = - 10 V, I _D = - 5 A		14		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = - 20 V, V _{GS} = 0 V, f = 1 MHz		970		pF
Output Capacitance	C _{oss}			120		
Reverse Transfer Capacitance	C _{rss}			95		
Total Gate Charge	Q _g	V _{DS} = - 20 V, V _{GS} = - 10 V, I _D = - 5 A		23	35	nC
		V _{DS} = - 20 V, V _{GS} = - 4.5 V, I _D = - 5 A		9.8	16	
Gate-Source Charge	Q _{gs}			3		
Gate-Drain Charge	Q _{gd}			5.2		
Gate Resistance	R _g	f = 1 MHz	1.0	5.5	11	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 20 V, R _L = 4 Ω I _D ≅ - 5 A, V _{GEN} = - 10 V, R _g = 1 Ω		7	14	ns
Rise Time	t _r			12	24	
Turn-Off DelayTime	t _{d(off)}			30	60	
Fall Time	t _f			9	18	
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 20 V, R _L = 4 Ω I _D ≅ - 5 A, V _{GEN} = - 4.5 V, R _g = 1 Ω		44	80	
Rise Time	t _r			33	60	
Turn-Off DelayTime	t _{d(off)}			28	55	
Fall Time	t _f			13	25	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			- 3.5	A
Pulse Diode Forward Current	I _{SM}				- 20	
Body Diode Voltage	V _{SD}	I _S = - 2 A, V _{GS} = 0 V		- 0.76	- 1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = - 2 A, dI/dt = 100 A/μs, T _J = 25 °C		27	50	ns
Body Diode Reverse Recovery Charge	Q _{rr}			19	35	nC
Reverse Recovery Fall Time	t _a			14		ns
Reverse Recovery Rise Time	t _b			13		

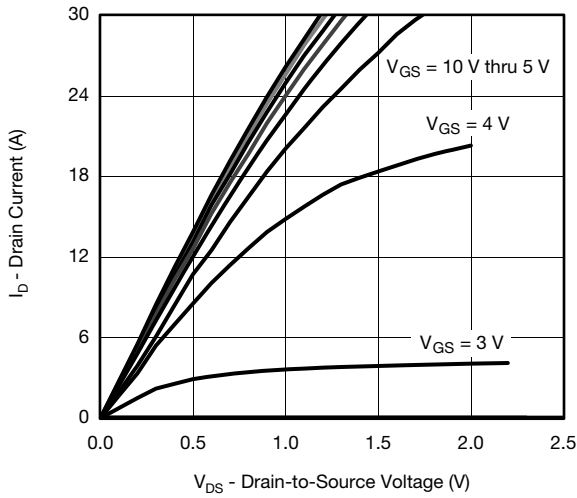
Notes:

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

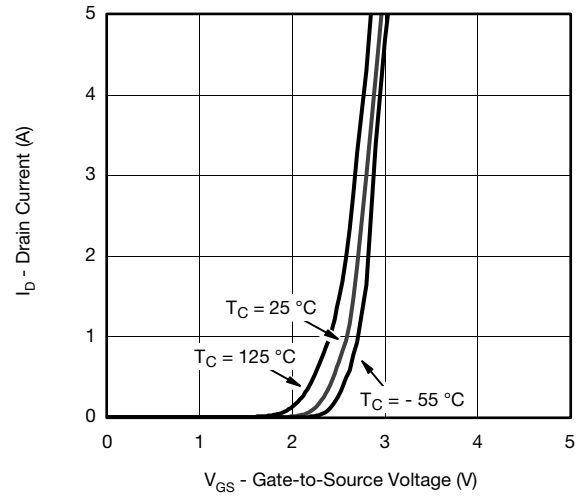
b. Guaranteed by design, not subject to production testing.

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.

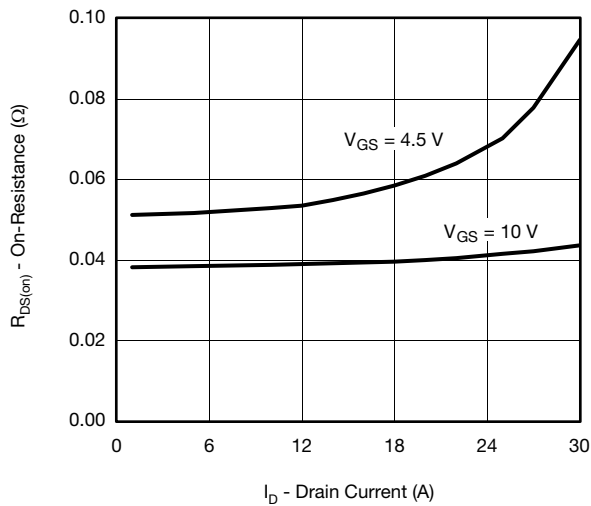
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



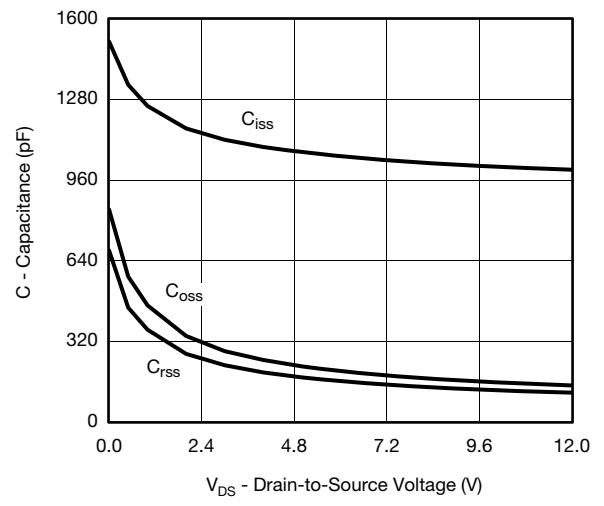
Output Characteristics



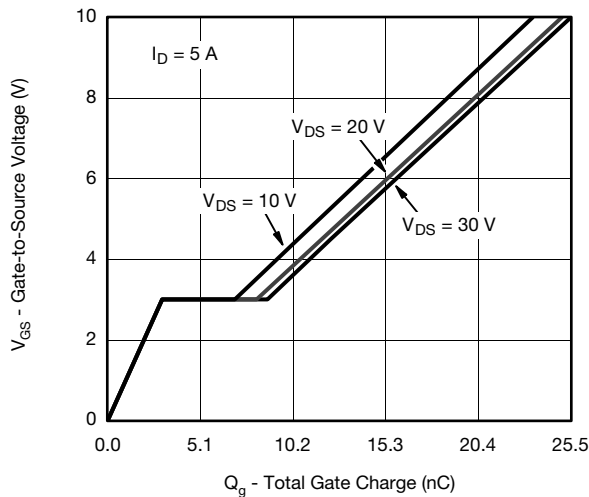
Transfer Characteristics



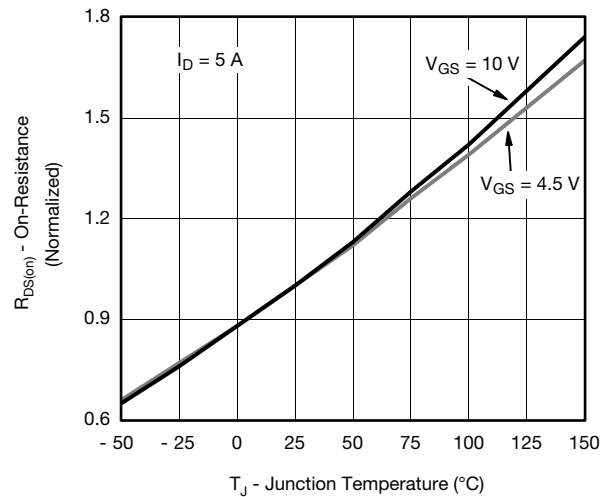
On-Resistance vs. Drain Current



Capacitance

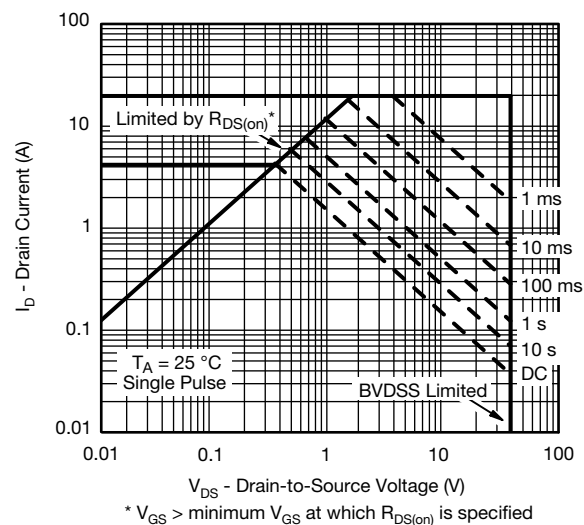
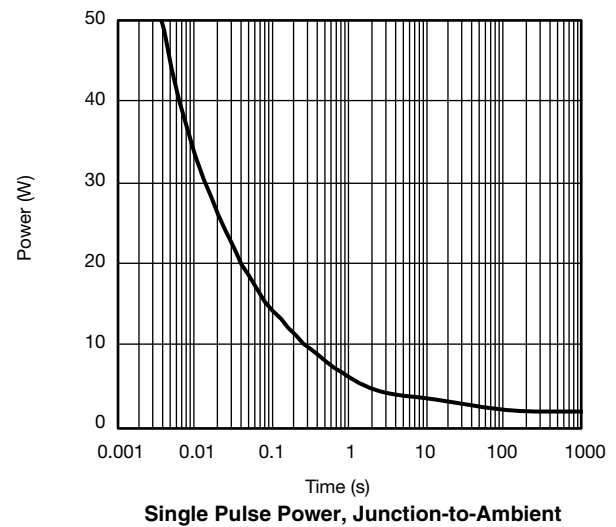
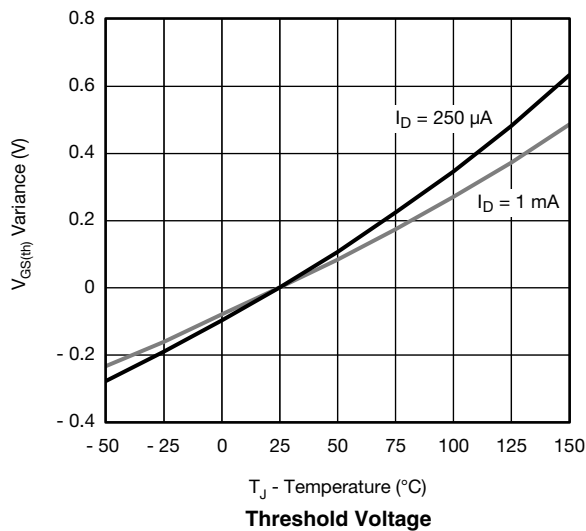
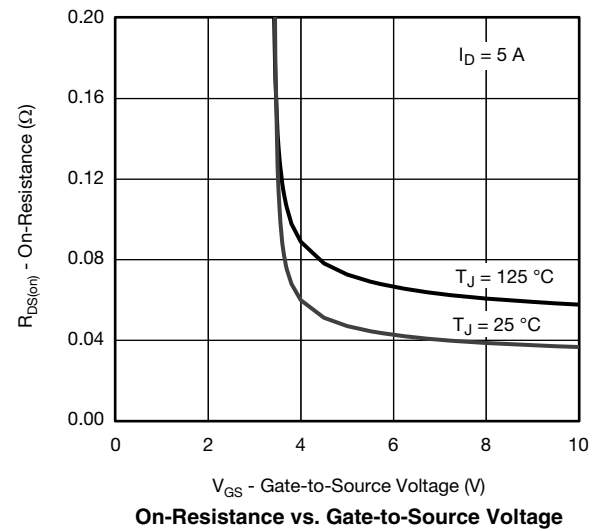
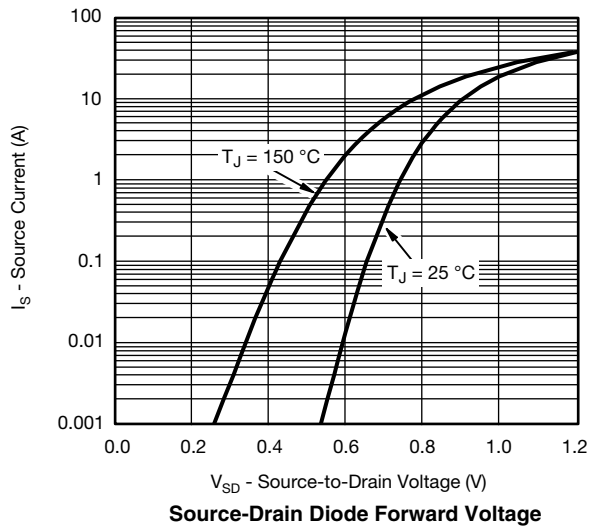


Gate Charge



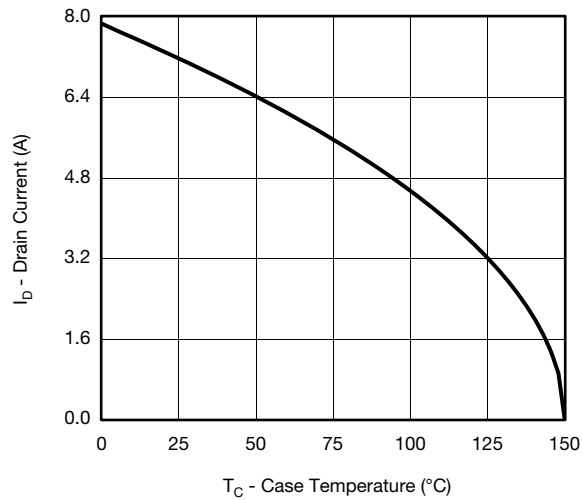
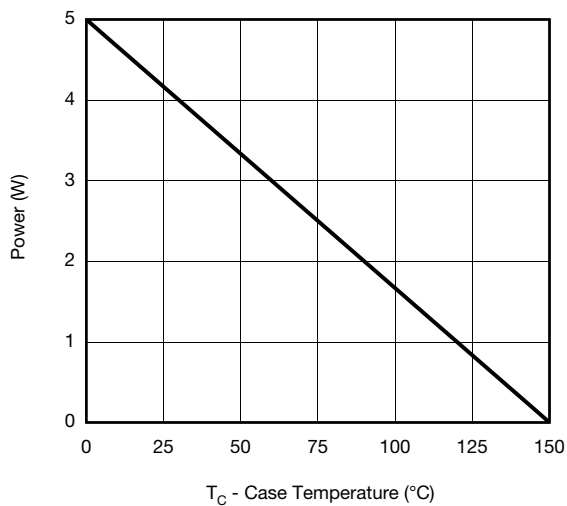
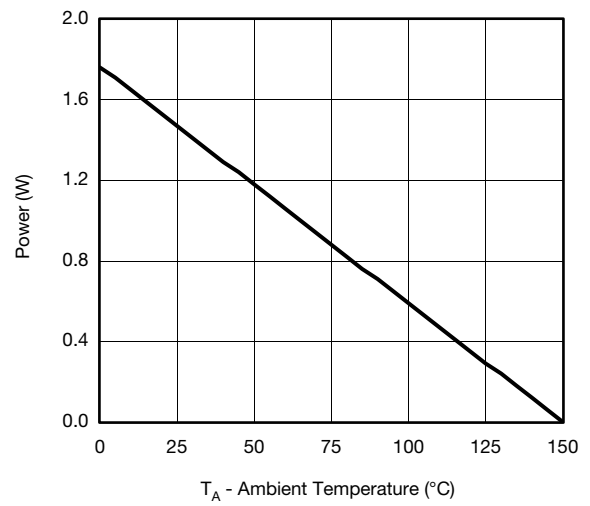
On-Resistance vs. Junction Temperature

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



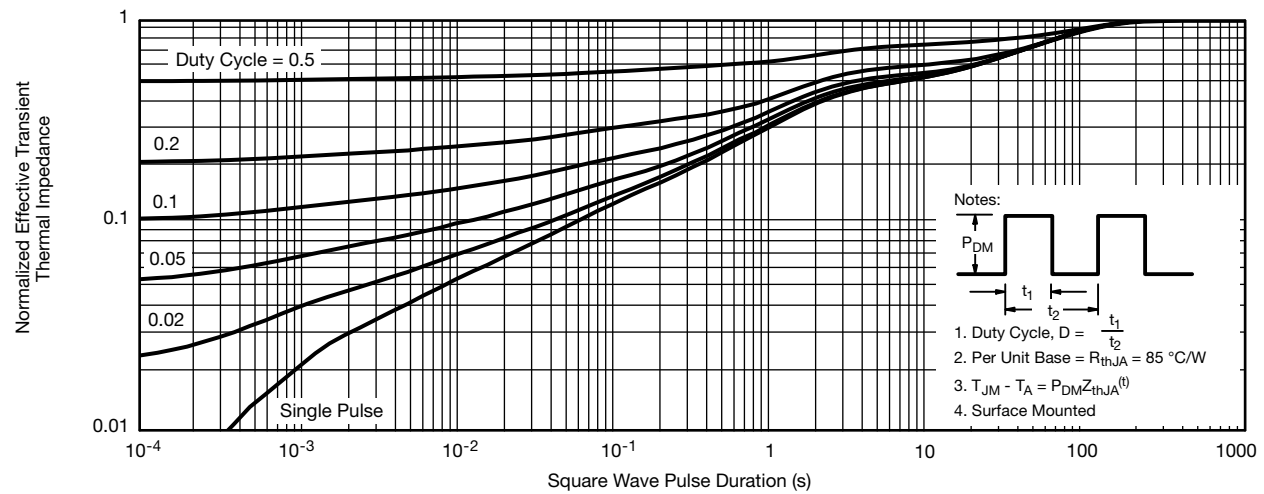
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area

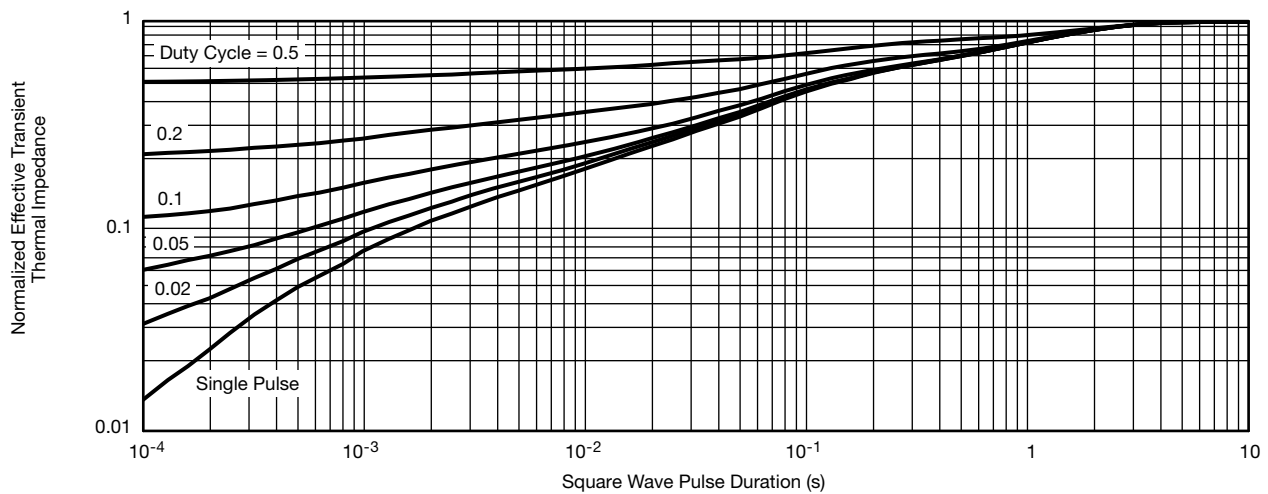
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Current Derating*

Power, 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.

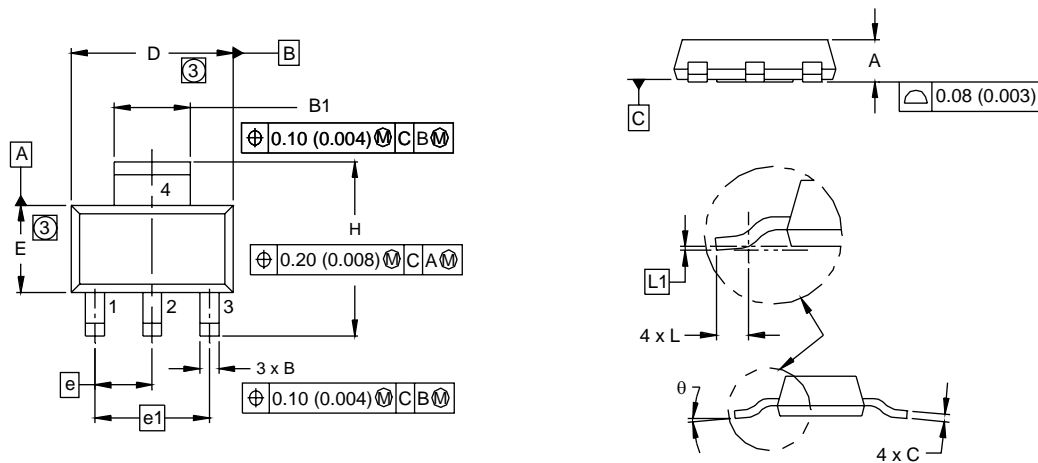
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

SOT-223 (HIGH VOLTAGE)

DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	1.55	1.80	0.061	0.071
B	0.65	0.85	0.026	0.033
B1	2.95	3.15	0.116	0.124
C	0.25	0.35	0.010	0.014
D	6.30	6.70	0.248	0.264
E	3.30	3.70	0.130	0.146
e	2.30 BSC		0.0905 BSC	
e1	4.60 BSC		0.181 BSC	
H	6.71	7.29	0.264	0.287
L	0.91	-	0.036	-
L1	0.061 BSC		0.0024 BSC	
θ	-	10°	-	10°
ECN: S-82109-Rev. A, 15-Sep-08				
DWG: 5969				

Notes

1. Dimensioning and tolerancing per ASME Y14.5M-1994.
2. Dimensions are shown in millimeters (inches).
3. Dimension do not include mold flash.
4. Outline conforms to JEDEC outline TO-261AA.

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