

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

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A)	Q _g (Typ.)
- 20	0.0040 at V _{GS} = 10 V	- 52	21.5 nC
	0.0060 at V _{GS} = 4.5 V	- 40	

FEATURES

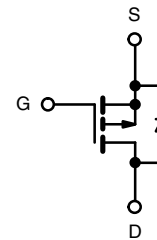
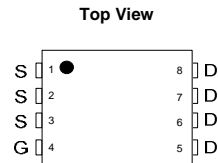
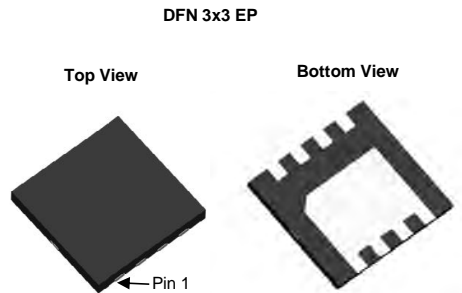
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- 100 % R_g Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Load Switch
- Adaptor/Battery Switch



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T _A = 25 °C, unless otherwise noted)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V _{DS}	- 20	V
Gate-Source Voltage		V _{GS}	± 16	
Continuous Drain Current (T _J = 150 °C)	T _C = 25 °C	I _D	- 52	A
	T _C = 70 °C		- 40 ^g	
	T _A = 25 °C		- 26 ^{b, c}	
	T _A = 70 °C		- 21 ^{b, c}	
Pulsed Drain Current		I _{DM}	- 150	
Continuous Source-Drain Diode Current	T _C = 25 °C	I _S	- 40 ^g	A
	T _A = 25 °C		- 4.5 ^{b, c}	
Maximum Power Dissipation	T _C = 25 °C	P _D	54	W
	T _C = 70 °C		34.7	
	T _A = 25 °C		5.0 ^{b, c}	
	T _A = 70 °C		3.2 ^{b, c}	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	- 55 to 150	°C
Soldering Recommendations (Peak Temperature) ^{d, e}			260	

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, f}	t ≤ 10 s	R _{thJA}	20	25	°C/W
Maximum Junction-to-Case (Drain)	Steady State	R _{thJC}	1.8	2.3	

Notes:

- a. Based on T_C = 25 °C.
- b. Surface Mounted on 1" x 1" FR4 board.
- c. t = 10 s.

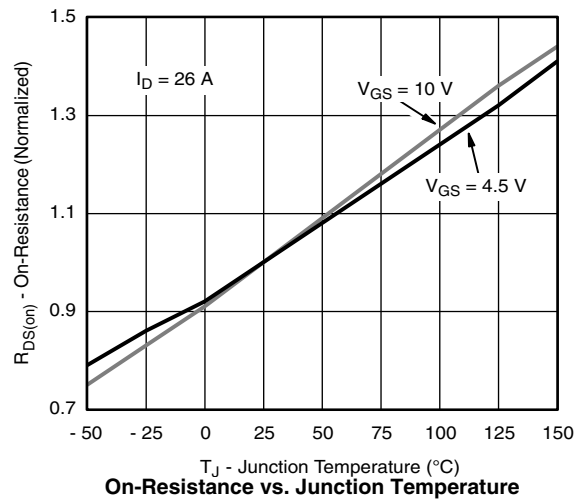
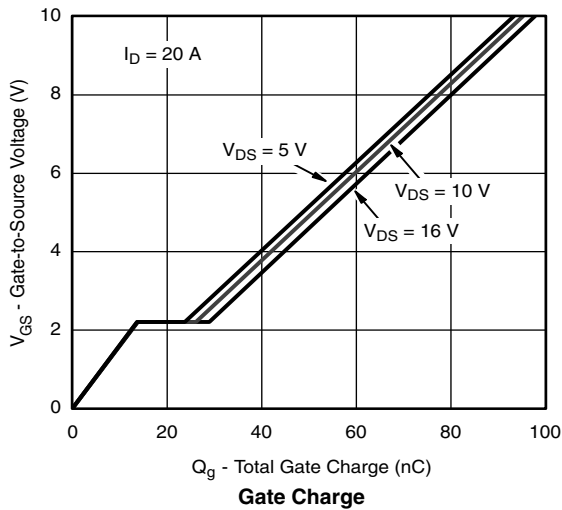
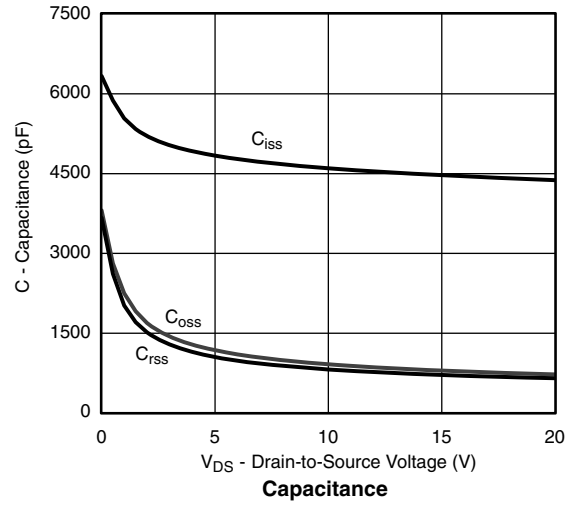
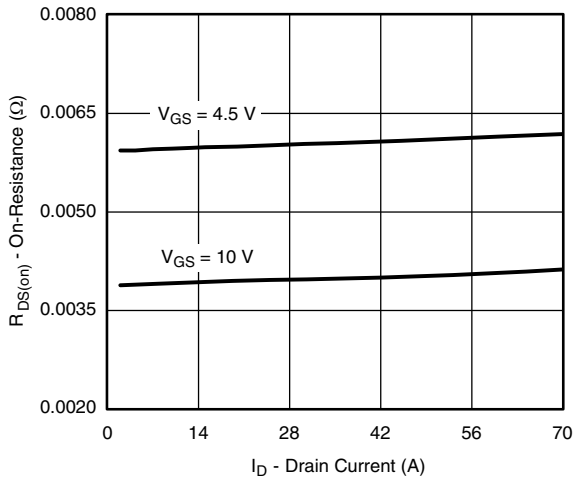
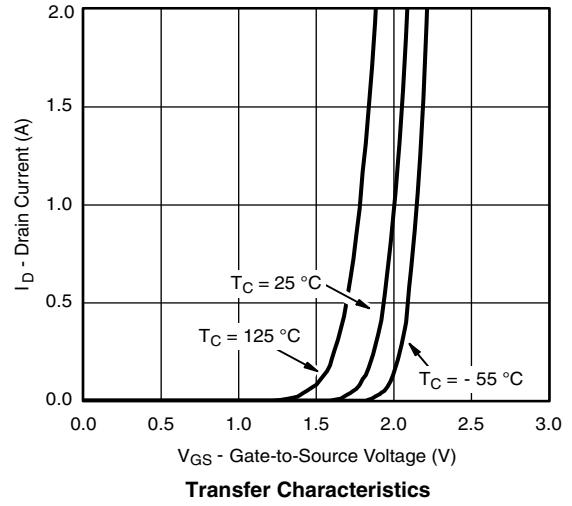
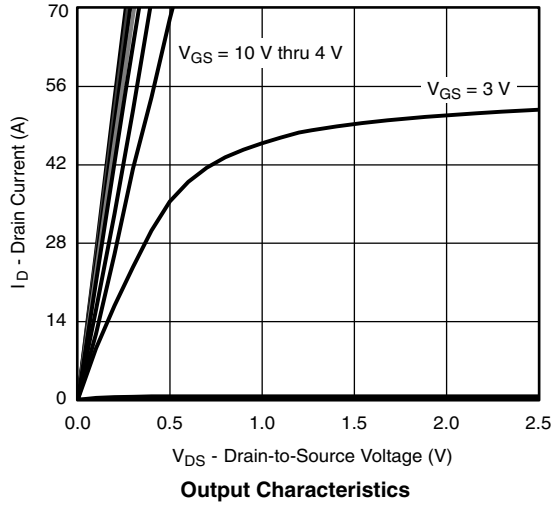
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0, I_D = -250\text{ }\mu\text{A}$	- 20			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		- 15		mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			4.5		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	- 1		- 2.2	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 16\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}$			- 1	μA
		$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			- 10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \leq -5\text{ V}, V_{GS} = -10\text{ V}$	- 30			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -26\text{ A}$		0.0040		Ω
		$V_{GS} = -4.5\text{ V}, I_D = -21\text{ A}$		0.0060		
Forward Transconductance ^a	g_{fs}	$V_{DS} = -10\text{ V}, I_D = -26\text{ A}$		58		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		4595		pF
Output Capacitance	C_{oss}			910		
Reverse Transfer Capacitance	C_{rss}			813		
Total Gate Charge	Q_g	$V_{DS} = -10\text{ V}, V_{GS} = -10\text{ V}, I_D = -20\text{ A}$		95.3	143	nC
				46.5	70	
Gate-Source Charge	Q_{gs}	$V_{DS} = -10\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -20\text{ A}$		13.7		
Gate-Drain Charge	Q_{gd}			12.5		
Gate Resistance	R_g	$f = 1\text{ MHz}$	0.4	1.9	3.8	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\text{ V}, R_L = 1\text{ }\Omega$ $I_D \cong -10\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$		19	30	ns
Rise Time	t_r			10	20	
Turn-Off Delay Time	$t_{d(off)}$			65	98	
Fall Time	t_f			13	20	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\text{ V}, R_L = 1\text{ }\Omega$ $I_D \cong -10\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$		55	83	
Rise Time	t_r			52	78	
Turn-Off Delay Time	$t_{d(off)}$			53	80	
Fall Time	t_f			25	38	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			- 40	A
Pulse Diode Forward Current ^a	I_{SM}				- 70	
Body Diode Voltage	V_{SD}	$I_S = -1\text{ A}$		- 0.74	- 1.1	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = -10\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		42	63	ns
Body Diode Reverse Recovery Charge	Q_{rr}			25	38	nC
Reverse Recovery Fall Time	t_a			12		ns
Reverse Recovery Rise Time	t_b			30		

Notes:

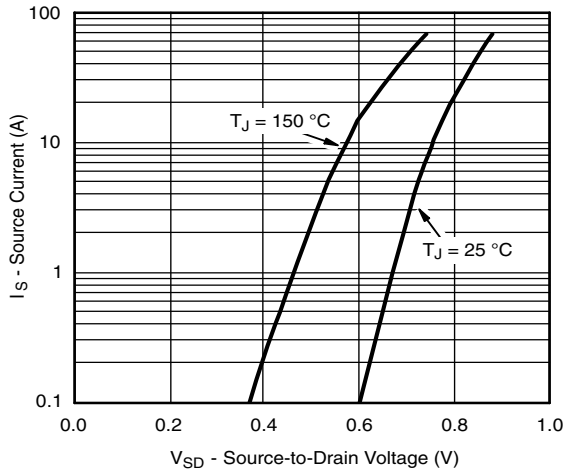
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.

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.

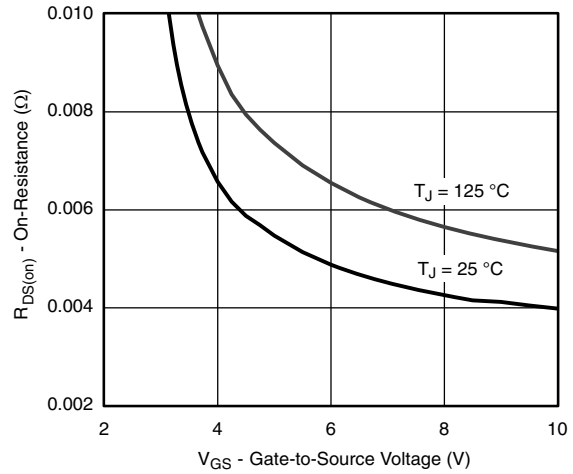
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



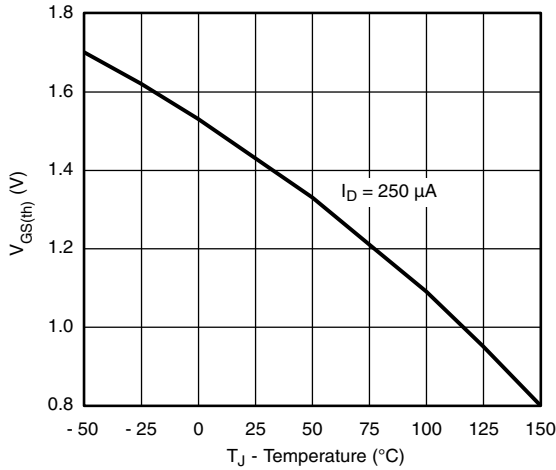
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



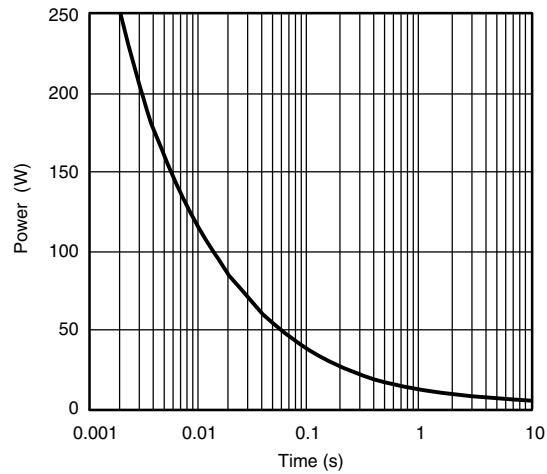
Source-Drain Diode Forward Voltage



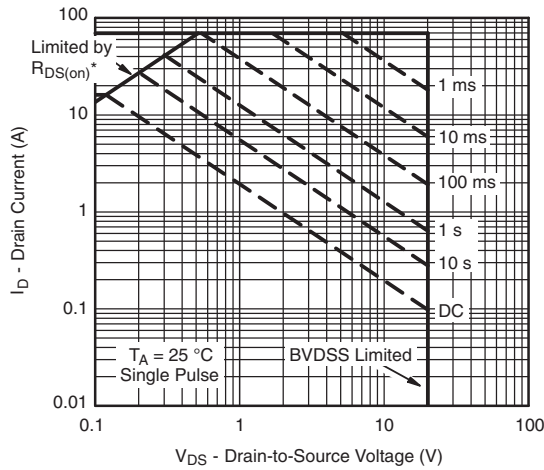
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

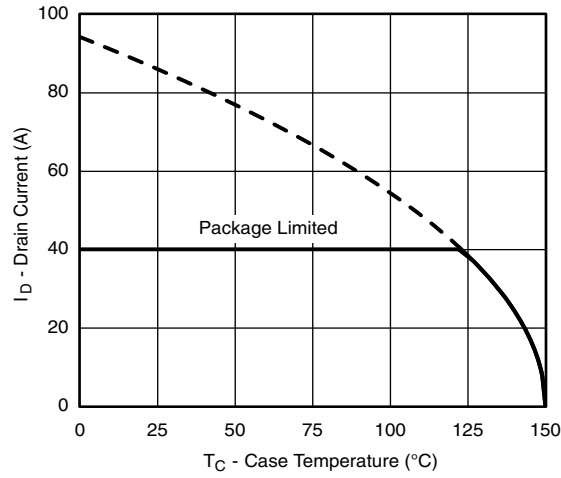


Single Pulse Power, Junction-to-Ambient

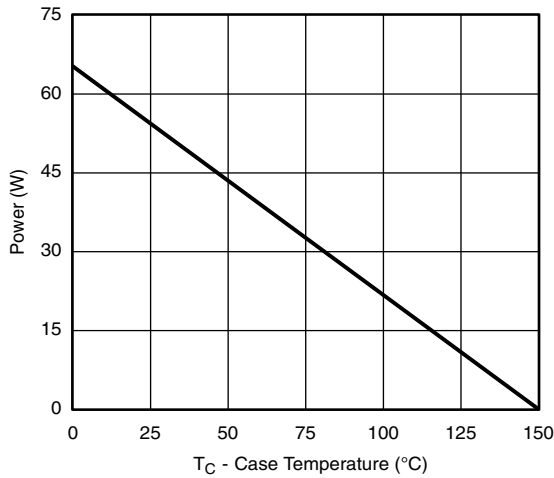


Safe Operating Area, Junction-to-Ambient

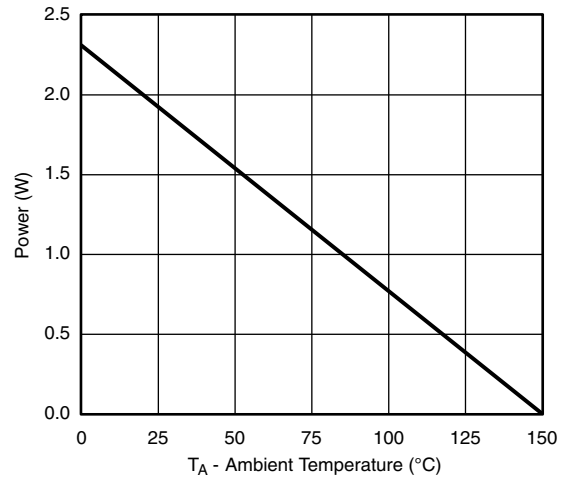
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating*



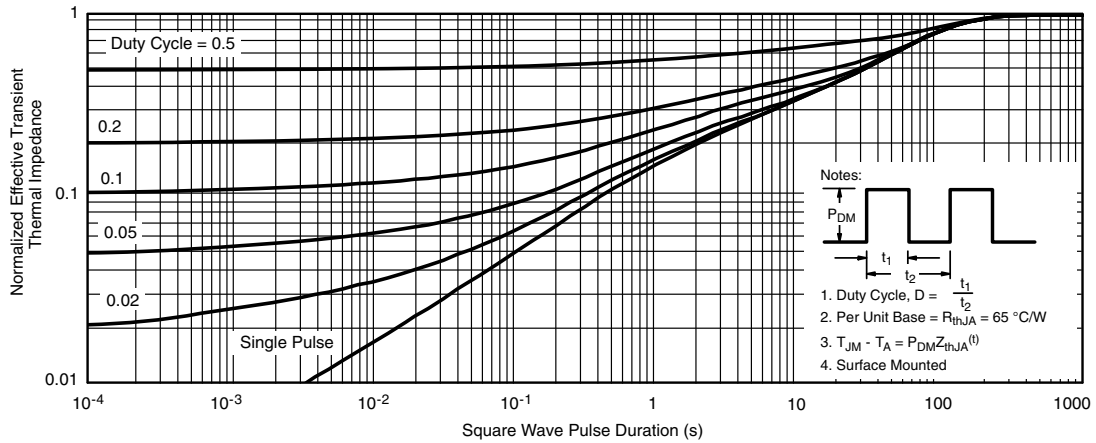
Power, Junction-to-Case



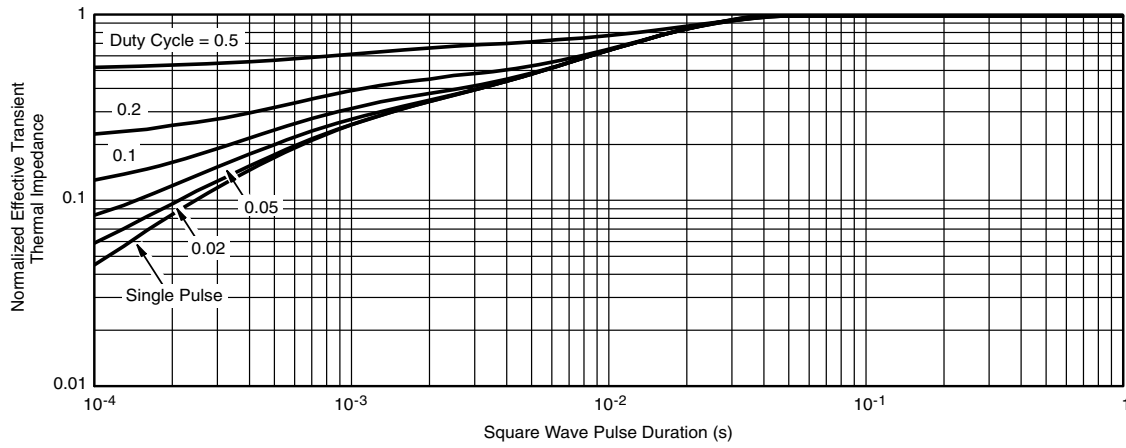
Power, Junction-to-Ambient

* 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.

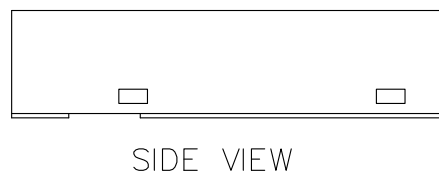
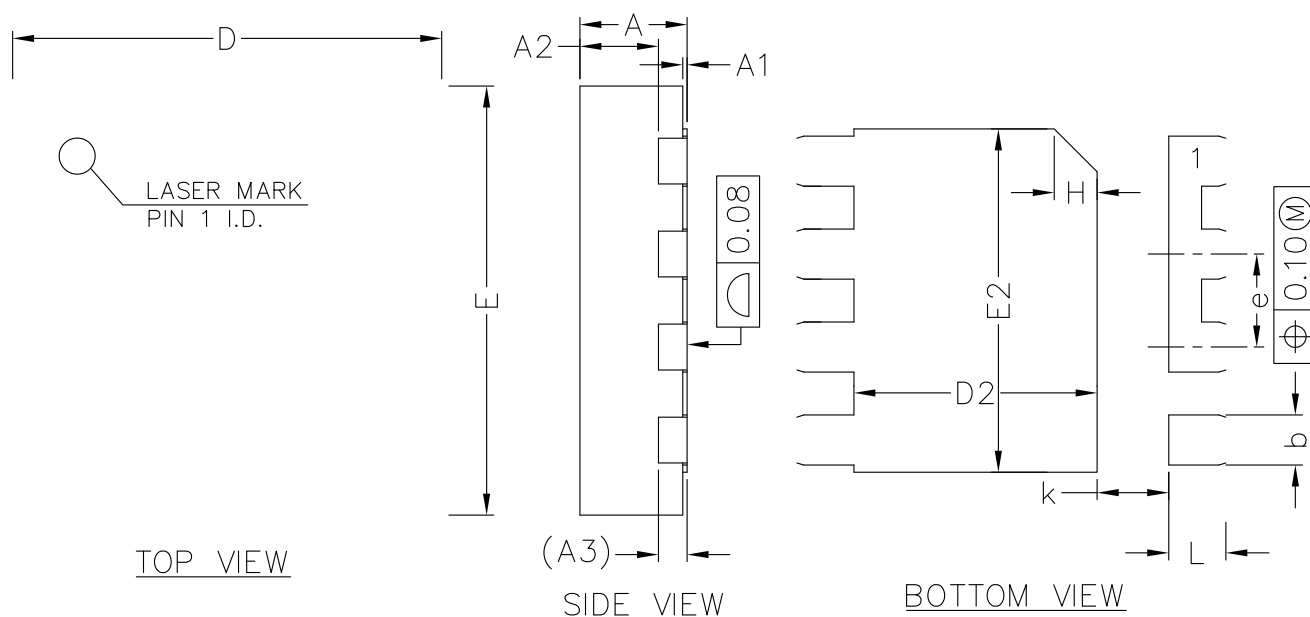
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A2	0.50	0.55	0.60
A3	0.20REF		
b	0.30	0.35	0.40
D	2.90	3.00	3.10
E	2.90	3.00	3.10
D2	1.60	1.70	1.80
E2	2.30	2.40	2.50
e	0.55	0.65	0.75
K	0.40	0.50	0.60
L	0.35	0.40	0.45

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