

## IPTC019N10NM5-VB Datasheet

### N-Channel 100 V (D-S) MOSFET

PRODUCT SUMMARY			
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω) MAX.	I <sub>D</sub> (A)	Q <sub>g</sub> (TYP.)
100	0.0012 at V <sub>GS</sub> = 10 V	415	130 nC

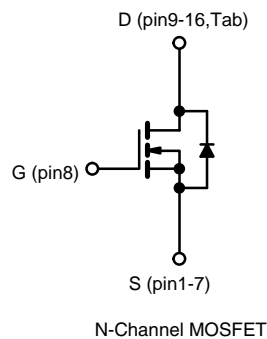
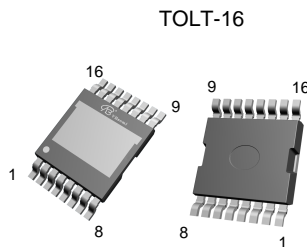
#### FEATURES

- SGT technology Power MOSFET
- Maximum 175°C junction temperature
- 100 % R<sub>g</sub> and UIS tested



#### APPLICATIONS

- Power supplies:
  - Uninterruptible power supplies
  - AC/DC switch-mode power supplies
  - Lighting
- Synchronous rectification
- DC/DC converter
- Motor drive switch
- DC/AC inverter
- Solar micro inverter
- Class D audio amplifier



ABSOLUTE MAXIMUM RATINGS (T <sub>C</sub> = 25 °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V <sub>DS</sub>	100	V
Gate-Source Voltage		V <sub>GS</sub>	± 20	
Continuous Drain Current (T <sub>J</sub> = 150 °C)	T <sub>C</sub> = 25 °C	I <sub>D</sub>	415	A
	T <sub>C</sub> = 100 °C		296	
Pulsed Drain Current (t = 100 μs)		I <sub>DM</sub>	1500	
Avalanche Current	L = 0.5 mH	I <sub>AS</sub>	100	
Single Avalanche Energy <sup>a</sup>		E <sub>AS</sub>	2500	mJ
Maximum Power Dissipation <sup>a</sup>	T <sub>C</sub> = 25 °C	P <sub>D</sub>	455 <sup>b</sup>	W
	T <sub>C</sub> = 100 °C		227 <sup>b</sup>	
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	-55 to +175	°C

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-Ambient (PCB Mount) <sup>c</sup>		R <sub>thJA</sub>	62	°C/W
Junction-to-Case (Drain)		R <sub>thJC</sub>	0.33	

**Notes**

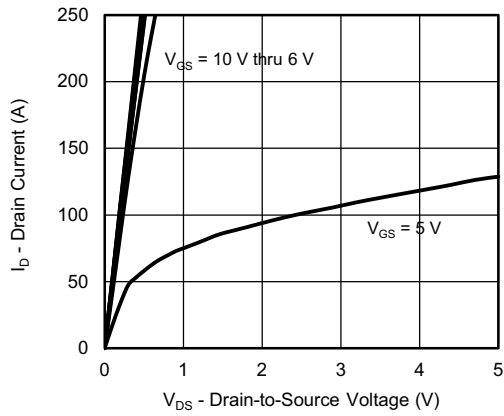
- Duty cycle ≤ 1 %.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR4 material).

<b>SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	100	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2	3	4	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$	-	-	$\pm 250$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 80\text{ V}, V_{GS} = 0\text{ V}$	-	-	1	$\mu\text{A}$
		$V_{DS} = 80\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	-	100	
		$V_{DS} = 80\text{ V}, V_{GS} = 0\text{ V}, T_J = 150\text{ }^\circ\text{C}$	-	-	5	mA
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}, V_{GS} = 10\text{ V}$	150	-	-	A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 60\text{ A}$	-	0.0012	-	$\Omega$
		$V_{GS} = 7.5\text{ V}, I_D = 50\text{ A}$	-	0.0015	-	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 25\text{ V}, I_D = 100\text{ A}$	-	260	-	S
<b>Dynamic <sup>b</sup></b>						
Input Capacitance	$C_{ISS}$	$V_{GS} = 0\text{ V}, V_{DS} = 50\text{ V}, f = 1\text{ MHz}$	-	11500	-	pF
Output Capacitance	$C_{OSS}$		-	3246	-	
Reverse Transfer Capacitance	$C_{RSS}$		-	18	-	
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{DS} = 50\text{ V}, V_{GS} = 10\text{ V}, I_D = 20\text{ A}$	-	130	-	nC
Gate-Source Charge <sup>c</sup>	$Q_{gs}$		-	50	-	
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$		-	30	55	
Gate Resistance	$R_g$	$f = 1\text{ MHz}$	-	0.8	1.2	$\Omega$
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = 50\text{ V}, R_L = 5\text{ }\Omega$ $I_D \cong 50\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$	-	33	-	ns
Rise Time <sup>c</sup>	$t_r$		-	30	-	
Turn-Off Delay Time <sup>c</sup>	$t_{d(off)}$		-	50	-	
Fall Time <sup>c</sup>	$t_f$		-	55	-	
<b>Drain-Source Body Diode Ratings and Characteristics <sup>b</sup></b> ( $T_C = 25\text{ }^\circ\text{C}$ )						
Pulsed Current ( $t = 100\text{ }\mu\text{s}$ )	$I_{SM}$		-	-	480	A
Forward Voltage <sup>a</sup>	$V_{SD}$	$I_F = 500\text{ A}, V_{GS} = 0\text{ V}$	-	0.75	1.2	V
Reverse Recovery Time	$t_{rr}$	$I_F = 50\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$	-	140	280	ns
Peak Reverse Recovery Charge	$I_{RM(REC)}$		-	11	20	A
Reverse Recovery Charge	$Q_{rr}$		-	0.3	0.8	$\mu\text{C}$

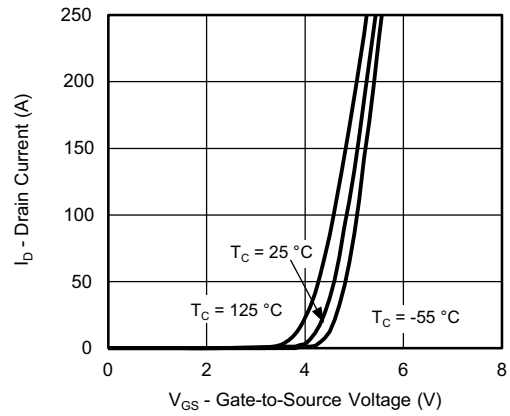
**Notes**

- 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. Independent of operating temperature.

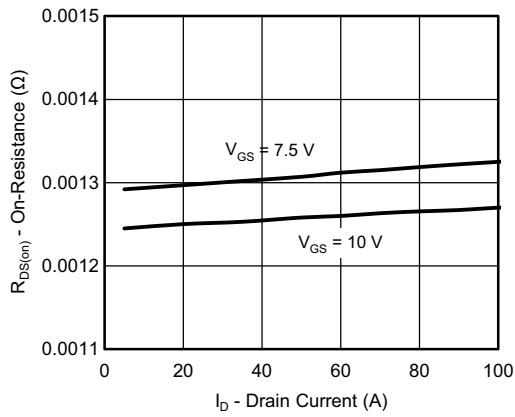
**TYPICAL CHARACTERISTICS** ( $T_C = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



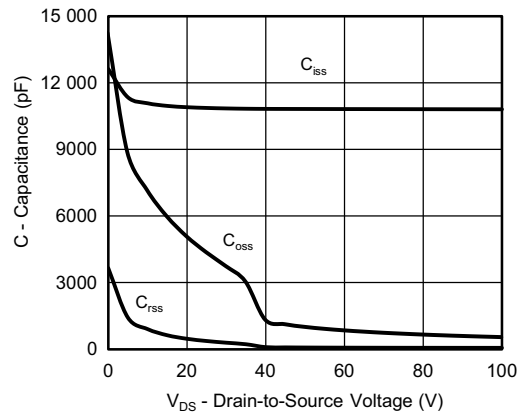
**Output Characteristics**



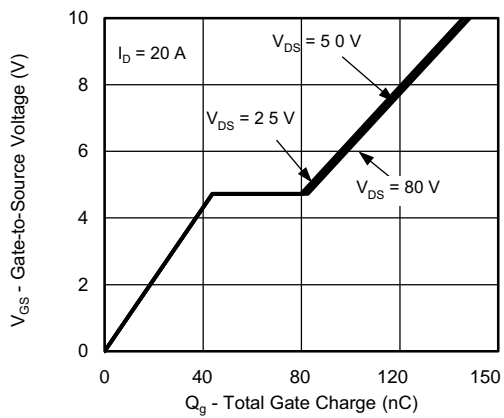
**Transfer Characteristics**



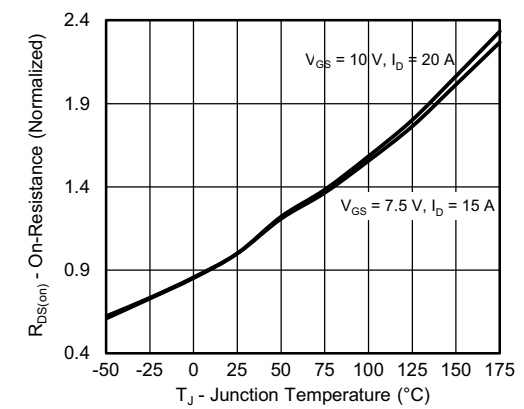
**On-Resistance vs. Drain Current and Gate Voltage**



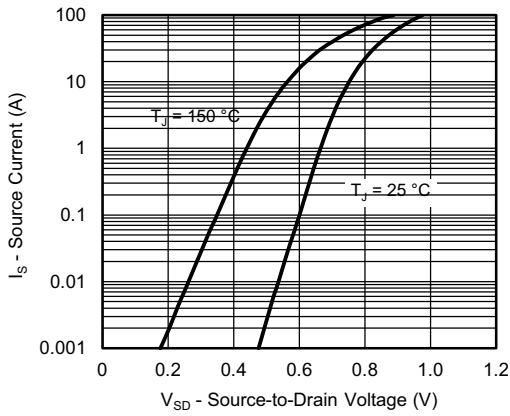
**Capacitance**



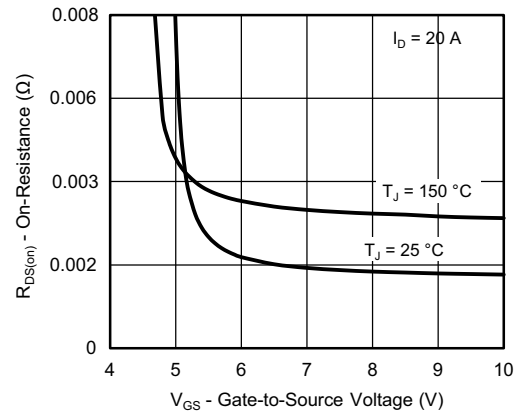
**Gate Charge**



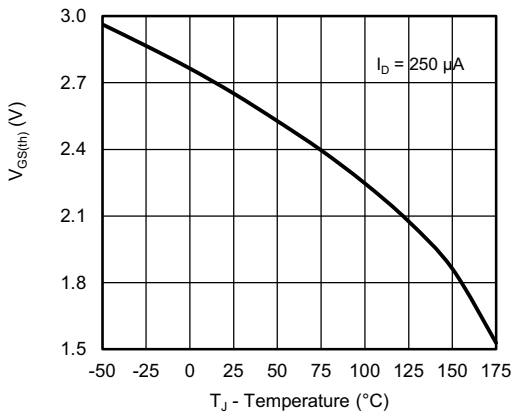
**On-Resistance vs. Junction Temperature**



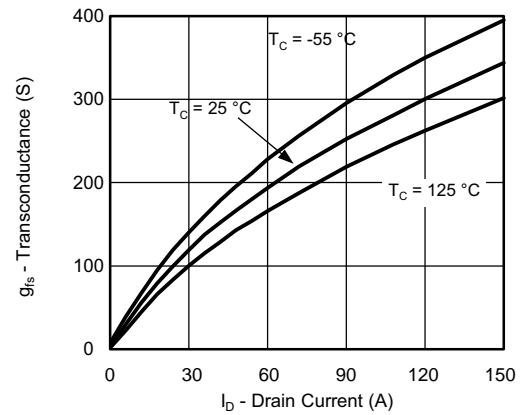
Source-Drain Diode Forward Voltage



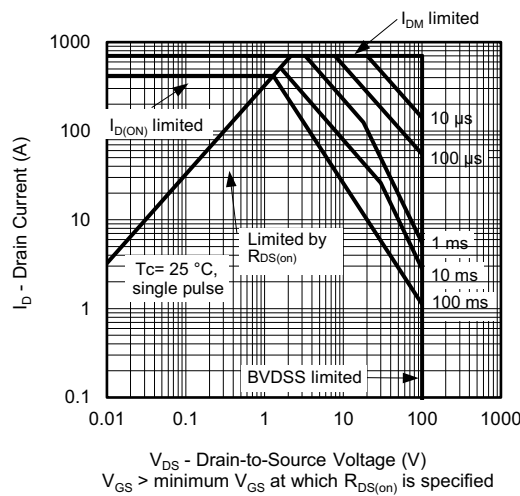
On-Resistance vs. Gate-to-Source Voltage



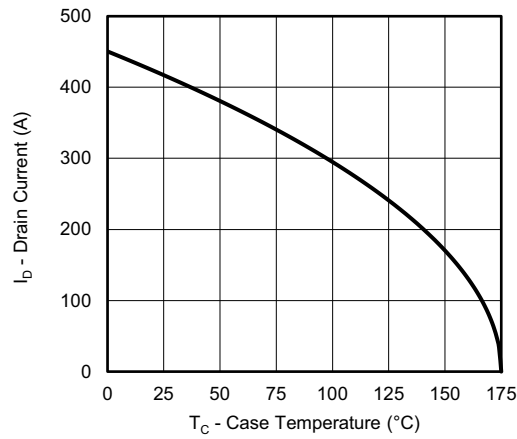
Threshold Voltage



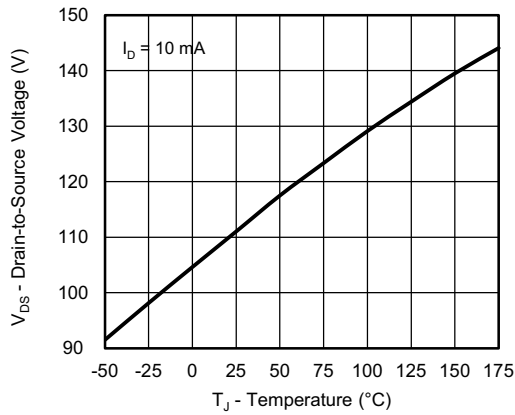
Transconductance



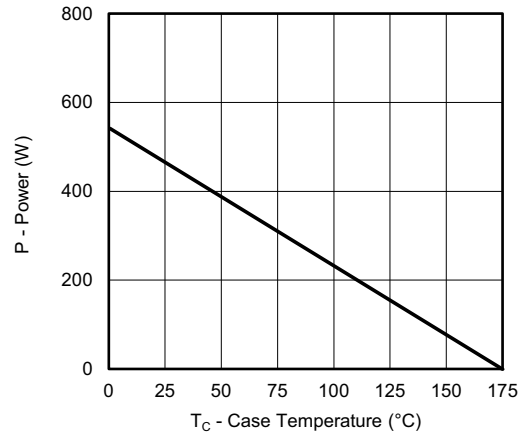
Safe Operating Area, Junction-to-Ambient



Current Derating <sup>a</sup>



Drain Source Breakdown vs. Junction Temperature

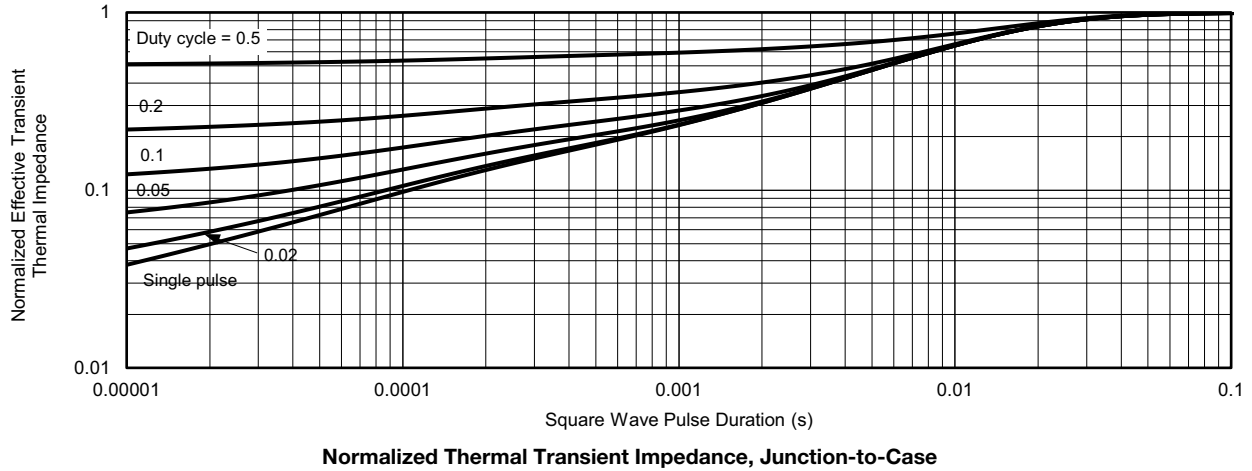


Power, Junction-to-Case

**Note**

- a. The power dissipation  $P_D$  is based on  $T_J \text{ max.} = 25 \text{ °C}$ , 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.

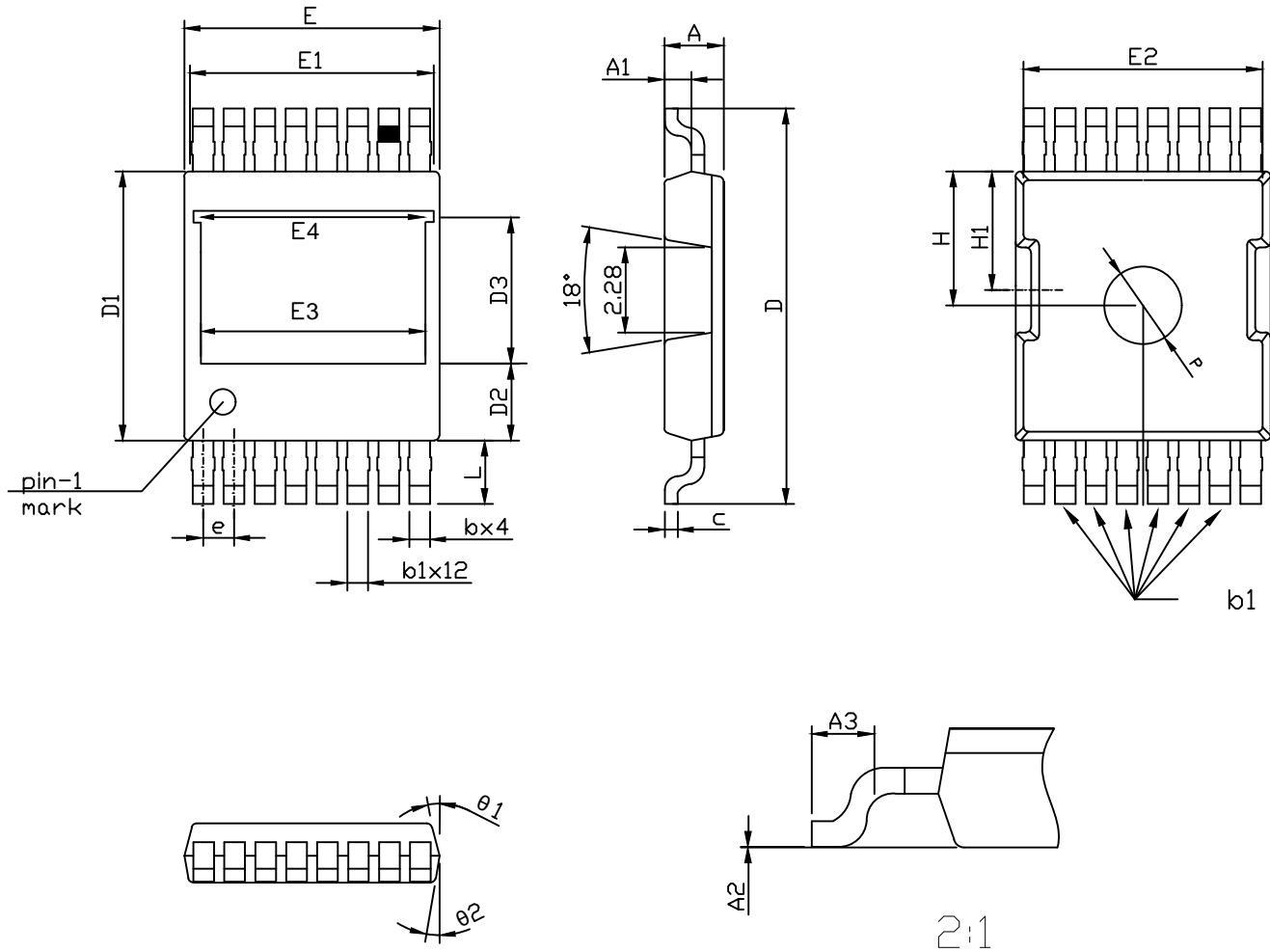
**THERMAL RATINGS** ( $T_C = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



**Note**

- The characteristics shown in the two graphs
  - Normalized Transient Thermal Impedance Junction to Ambient (25 °C)
  - Normalized Transient Thermal Impedance Junction to Case (25 °C)
 are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

## Package Outlines



UNIT : mm

<b>SYMBOLS</b>	A	A1	A2	A3	b	b1	C	D
MIN	2.25	1.00	0.01	1.50REF	0.68	0.75	0.45	14.80
NOM	2.30	1.04	0.08		0.70	0.85	0.50	15.00
MAX	2.35	1.08	0.16		0.74	0.95	0.55	15.20
<b>SYMBOLS</b>	D1	D2	D3	E	E1	E2	E3	E4
MIN	10.00	2.40	5.77REF	9.70	9.46REF	9.25REF	8.25REF	8.70REF
NOM	10.10	2.60		9.90				
MAX	10.30	2.80		10.10				
<b>SYMBOLS</b>	e	H	H1	L	P	1	2	
MIN	1.18	5.00	4.40	2.40	2.80	7°	7°	
NOM	1.20	5.20	4.60	2.45	3.00	-	-	
MAX	1.22	5.40	4.80	2.50	3.20	9°	9°	

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