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# Bipolar Power Transistors

## 100 V, 3.0 A, Low $V_{CE(sat)}$

### PNP Transistor

## NSV1C300CT

ON Semiconductor's e<sup>2</sup>PowerEdge family of low  $V_{CE(sat)}$  transistors are surface mount devices featuring ultra-low saturation voltage,  $V_{CE(sat)}$ , and high current gain capability. These are designed for use in lower voltage, high speed switching applications where affordable efficient energy control is important.

Housed in an ultra slim LFAK4 5x6 package, typical applications are DC-DC converters and power management in portable and battery powered products such as cellular and cordless phones, digital cameras and MP3 players where PCB space is at a premium. The LFAK4 5x6 package also contains wettable flanks which are a requirement for the automotive industry's optical inspection methods that are implemented in end applications such as air bag deployment, powertrain control units, and instrument clusters.

#### Features

- Complement to NSS1C301CT
- Ultra-slim LFAK4 Package (5 x 6 mm) with Wettable Flanks
- NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

#### MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	-100	Vdc
Collector-Base Voltage	$V_{CBO}$	-140	Vdc
Emitter-Base Voltage	$V_{EB}$	-6.0	Vdc
Base Current - Continuous	$I_B$	-0.5	Adc
Collector Current - Continuous	$I_C$	-3.0	Adc
Collector Current - Peak	$I_{CM}$	-6.0	A
Total Power Dissipation Total $P_D$ @ $T_A = 25^\circ\text{C}$ (Note 1) Total $P_D$ @ $T_A = 25^\circ\text{C}$ (Note 2)	$P_D$	5.0 1.0	W
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Mounted on 1" sq. (645 sq. mm) Collector pad on FR-4 bd material.
2. Mounted on 0.012" sq. (7.6 sq. mm) Collector pad on FR-4 bd material.



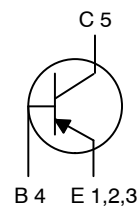
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## PNP TRANSISTOR

### -3.0 AMPERES

### -100 VOLTS

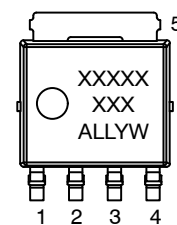


Schematic



LFAK4 5x6  
CASE 760AB

#### MARKING DIAGRAM



(Top View)

XXXXXX = Specific Device Code  
A = Assembly Location  
LL = Wafer Lot  
Y = Year  
W = Work Week

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

# NSV1C300CT

## ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
NSS1C300CTWG	LFP4K4 5x6 (Pb-Free)	3,000 / Tape & Reel
NSV1C300CTWG*	LFP4K4 5x6 (Pb-Free)	3,000 / Tape & Reel

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

\*NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JA}$	40	°C/W
Junction-to-Ambient on 1" sq. (645 sq. mm) Collector pad on FR-4 bd material	$R_{\theta JA}$	120	
Junction-to-Ambient on 0.012" sq. (7.6 sq. mm) Collector pad on FR-4 bd material			

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ( $I_C = -10\text{ mA}$ , $I_B = 0$ )	$V_{(BR)CEO}$	-100	-	-	Vdc
Collector-Base Breakdown Voltage ( $I_C = -0.1\text{ mA}$ , $I_E = 0$ )	$V_{(BR)CBO}$	-140	-	-	Vdc
Emitter-Base Breakdown Voltage ( $I_E = -0.1\text{ mA}$ , $I_C = 0$ )	$V_{(BR)EBO}$	-6.0	-	-	Vdc
Collector Cutoff Current ( $V_{CB} = -140\text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	-	-	-0.1	$\mu\text{Adc}$
Emitter Cutoff Current ( $V_{EB} = -6.0\text{ Vdc}$ )	$I_{EBO}$	-	-	-0.1	$\mu\text{Adc}$

### ON CHARACTERISTICS

DC Current Gain (Note 3) ( $I_C = -0.1\text{ A}$ , $V_{CE} = -2.0\text{ V}$ ) ( $I_C = -0.5\text{ A}$ , $V_{CE} = -2.0\text{ V}$ ) ( $I_C = -1.0\text{ A}$ , $V_{CE} = -2.0\text{ V}$ ) ( $I_C = -3.0\text{ A}$ , $V_{CE} = -2.0\text{ V}$ )	$h_{FE}$	180 180 120 50	- - - -	- - 500 -	-
Collector-Emitter Saturation Voltage (Note 3) ( $I_C = -0.1\text{ A}$ , $I_B = -10\text{ mA}$ ) ( $I_C = -1.0\text{ A}$ , $I_B = -0.100\text{ A}$ ) ( $I_C = -2.0\text{ A}$ , $I_B = -0.200\text{ A}$ ) ( $I_C = -3.0\text{ A}$ , $I_B = -0.300\text{ A}$ )	$V_{CE(sat)}$	- - - -	- - - -	-0.070 -0.150 -0.250 -0.400	V
Base-Emitter Saturation Voltage (Note 3) ( $I_C = -1.0\text{ A}$ , $I_B = -0.1\text{ A}$ )	$V_{BE(sat)}$	-	-	-1.0	V
Base-Emitter Turn-on Voltage (Note 3) ( $I_C = -1.0\text{ A}$ , $V_{CE} = -2.0\text{ V}$ )	$V_{BE(on)}$	-	-	-0.900	V
Cutoff Frequency ( $I_C = -500\text{ mA}$ , $V_{CE} = -10\text{ V}$ , $f = 100\text{ MHz}$ )	$f_T$	-	100	-	MHz
Input Capacitance ( $V_{EB} = -5.0\text{ V}$ , $f = 1.0\text{ MHz}$ )	$C_{ibo}$	-	360	-	pF
Output Capacitance ( $V_{CB} = -10\text{ V}$ , $f = 1.0\text{ MHz}$ )	$C_{obo}$	-	60	-	pF

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

3. Pulsed Condition: Pulse Width = 300 msec, Duty Cycle  $\leq 2\%$ .

TYPICAL CHARACTERISTICS

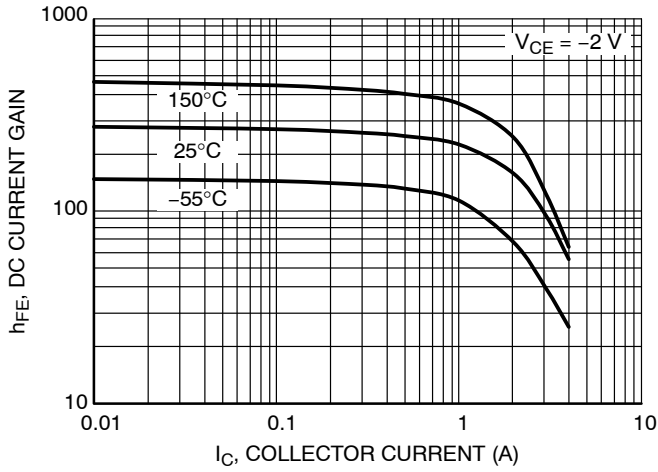


Figure 1. DC Current Gain

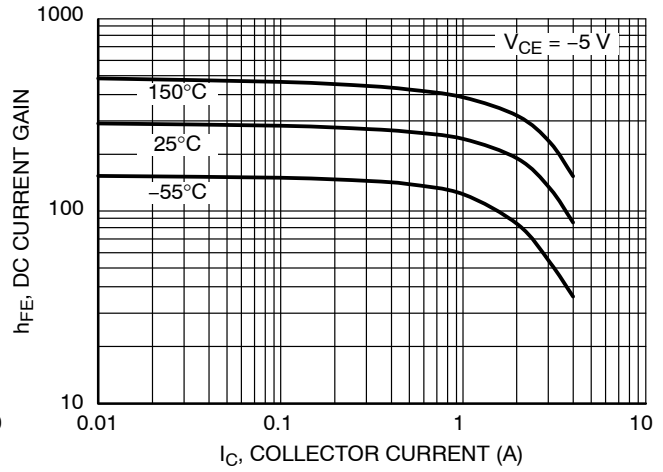


Figure 2. DC Current Gain

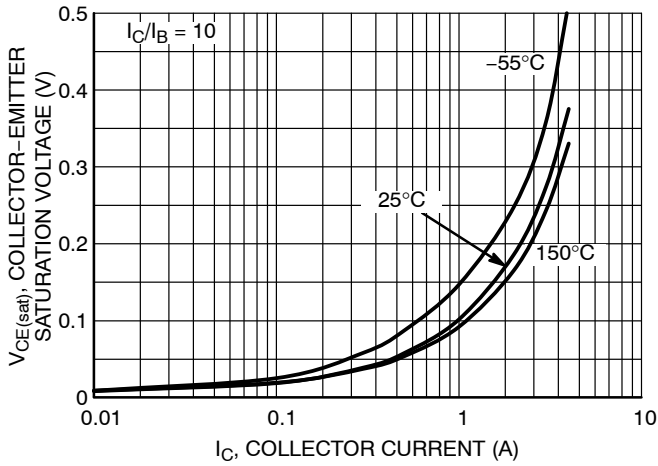


Figure 3. Collector-Emitter Saturation Voltage

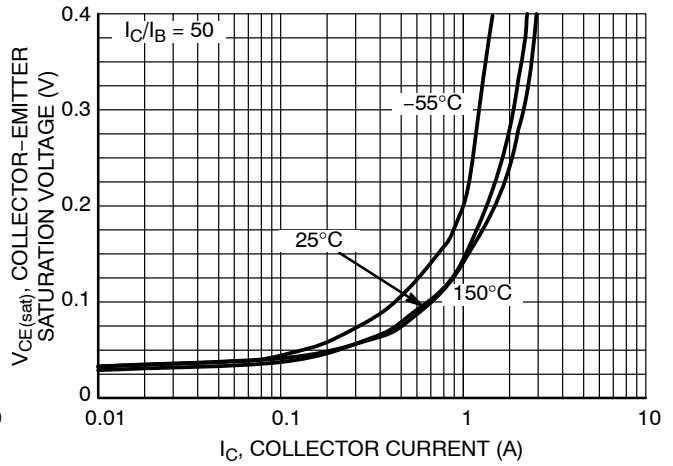


Figure 4. Collector-Emitter Saturation Voltage

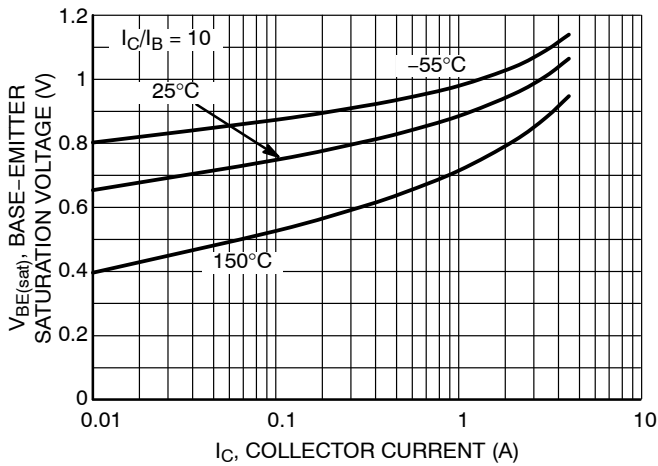


Figure 5. Base-Emitter Saturation Voltage

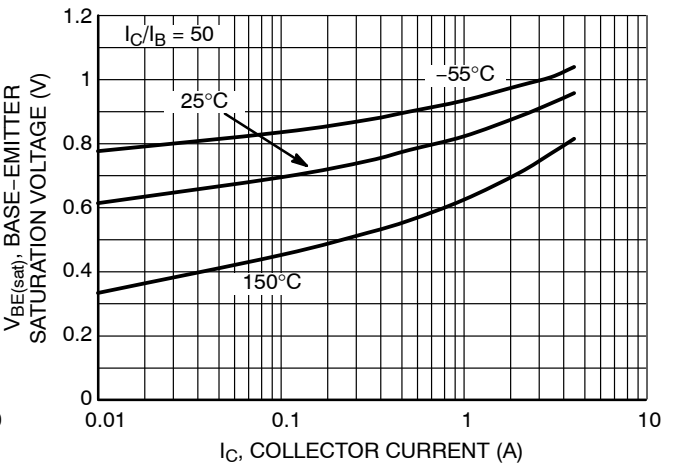


Figure 6. Base-Emitter Saturation Voltage

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## TYPICAL CHARACTERISTICS

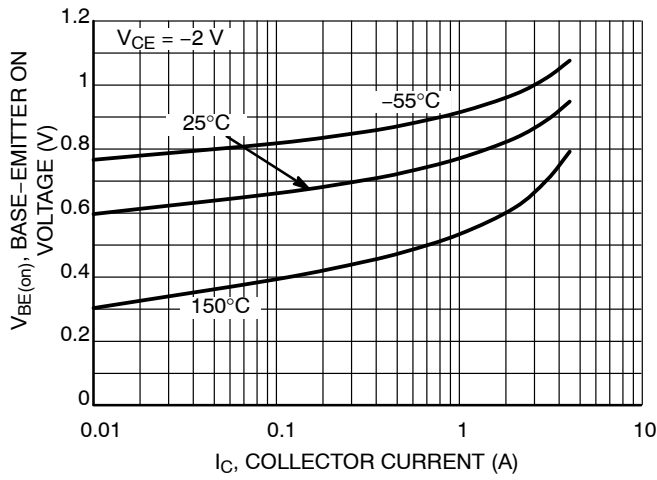


Figure 7. Base-Emitter On Voltage

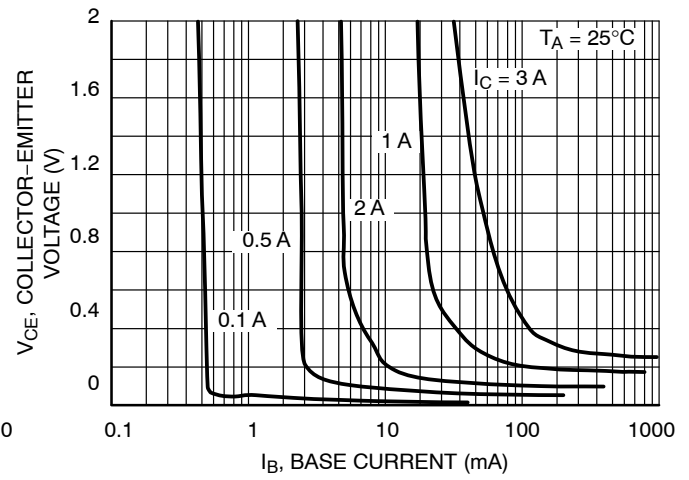


Figure 8. Collector Saturation Region

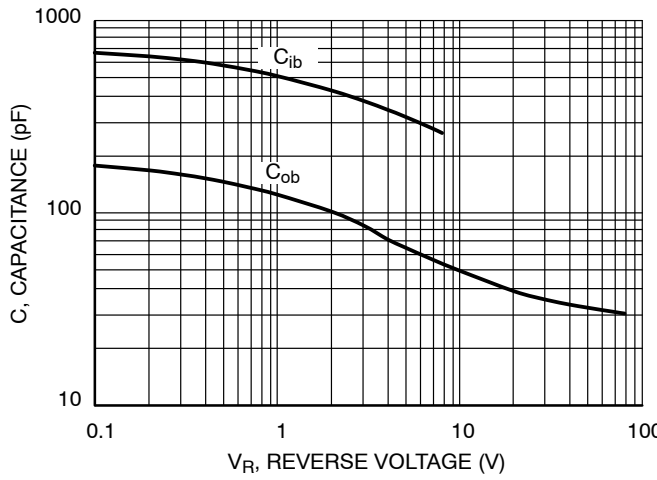


Figure 9. Capacitance

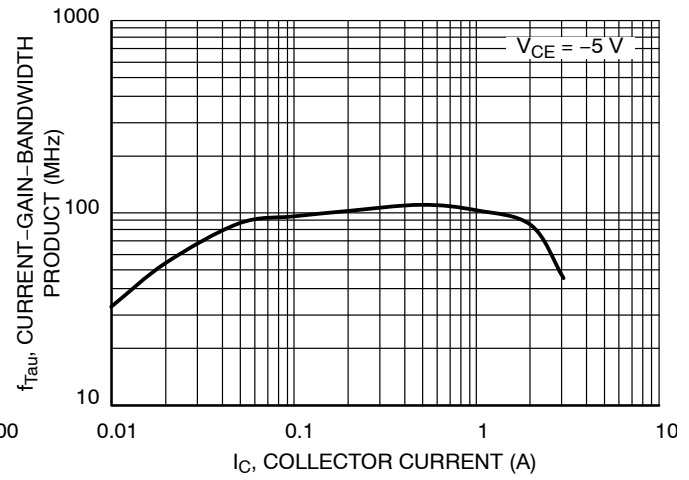


Figure 10. Current-Gain-Bandwidth Product

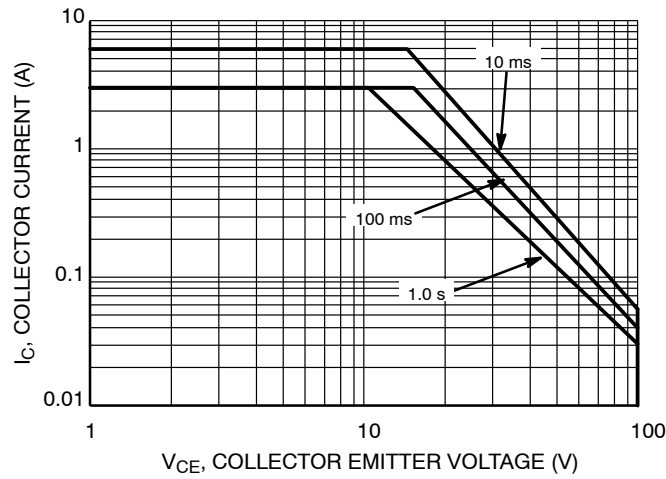


Figure 11. Safe Operating Area

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## TYPICAL CHARACTERISTICS

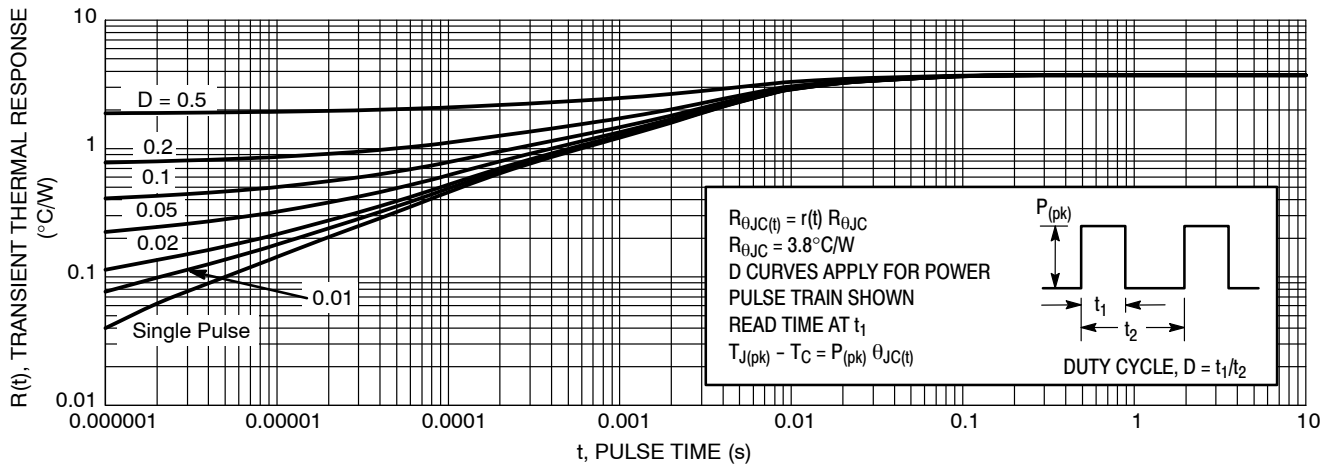
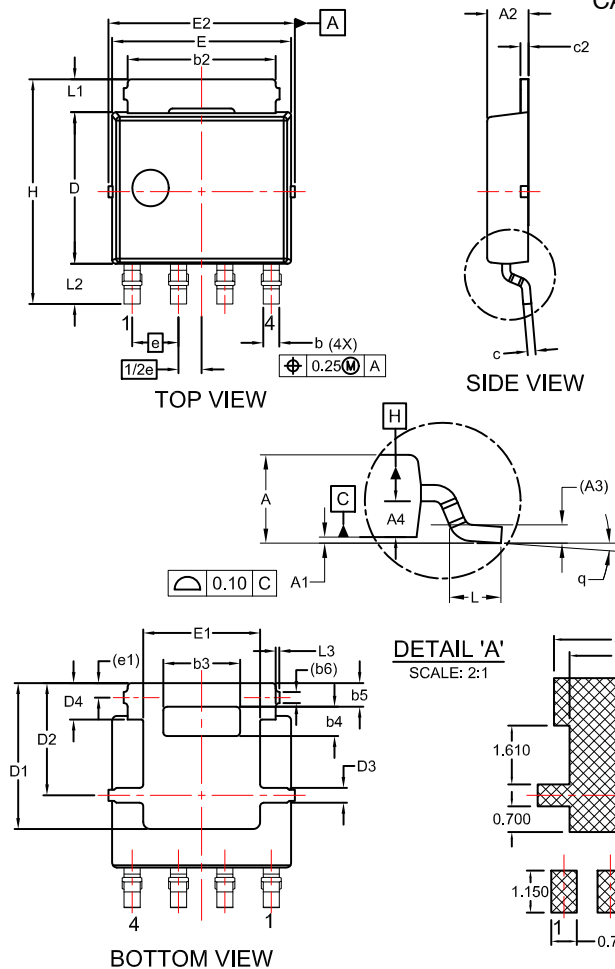


Figure 12. Typical Transient Thermal Response, Junction-to-Case

# NSV1C300CT

## PACKAGE DIMENSIONS

### LFPAK4 5x6 CASE 760AB ISSUE C



#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.150mm PER SIDE.
4. DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
5. DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.

UNIT IN MILLIMETER			
DIM	MIN	NOM	MAX
A	1.10	1.20	1.30
A1	0.00	0.08	0.15
A2	1.10	1.15	1.20
A3	0.25 REF		
A4	0.45	0.50	0.55
b	0.40	0.45	0.50
b2	3.80	4.10	4.40
b3	2.00	2.10	2.20
b4	0.70	0.80	0.90
b5	0.55	0.65	0.75
b6	0.31 REF		
c	0.19	0.22	0.25
c2	0.19	0.22	0.25
D	4.05	4.15	4.25
D1	3.80	4.00	4.20
D2	3.00	3.10	3.20
D3	0.30	0.40	0.50
D4	0.90	1.00	1.10
E	4.80	4.90	5.00
E1	3.10	3.20	3.30
E2	5.00	5.15	5.30
e	1.27 BSC		
1/2e	0.635 BSC		
e1	0.40 REF		
H	6.00	6.15	6.30
L	0.40	0.65	0.85
L1	0.80	0.90	1.00
L2	0.90	1.10	1.30
L3	0.00	0.10	0.20
q	0°	4°	8°

#### RECOMMENDED LAND PATTERN

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