

# Bipolar Power Transistors

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

### NPN Transistor

## NSV1C301CT

onsemi'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 LFPACK4 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 LFPACK4 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 NSV1C300CT
- Ultra-slim LFPACK4 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)

Symbol	Rating	Value	Unit
$V_{CEO}$	Collector-Emitter Voltage	100	Vdc
$V_{CBO}$	Collector-Base Voltage	140	Vdc
$V_{EB}$	Emitter-Base Voltage	6.0	Vdc
$I_B$	Base Current - Continuous	0.5	Adc
$I_C$	Collector Current - Continuous	3.0	Adc
$I_{CM}$	Collector Current - Peak	6.0	A
$P_D$	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)	5.0 1.0	W
$T_J, T_{stg}$	Operating and Storage Junction Temperature Range	-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.

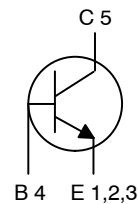
### NPN TRANSISTOR

#### 3.0 AMPERES

#### 100 VOLTS

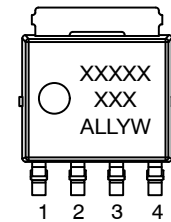


LFPACK4 5x6  
CASE 760AB



Schematic

#### 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 5 of this data sheet.

# NSV1C301CT

## THERMAL CHARACTERISTICS

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

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

Symbol	Characteristic	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

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

### ON CHARACTERISTICS

$h_{FE}$	DC Current Gain (Note 3) ( $I_C = 0.1 \text{ A}$ , $V_{CE} = 2.0 \text{ V}$ ) ( $I_C = 0.5 \text{ A}$ , $V_{CE} = 2.0 \text{ V}$ ) ( $I_C = 1.0 \text{ A}$ , $V_{CE} = 2.0 \text{ V}$ ) ( $I_C = 3.0 \text{ A}$ , $V_{CE} = 2.0 \text{ V}$ )	200 200 120 80	- - - -	- - 500 -	-
$V_{CE(sat)}$	Collector - Emitter Saturation Voltage (Note 3) ( $I_C = 0.1 \text{ A}$ , $I_B = 10 \text{ mA}$ ) ( $I_C = 1.0 \text{ A}$ , $I_B = 0.100 \text{ A}$ ) ( $I_C = 2.0 \text{ A}$ , $I_B = 0.200 \text{ A}$ ) ( $I_C = 3.0 \text{ A}$ , $I_B = 0.300 \text{ A}$ )	- - - -	0.015 0.045 0.080 0.115	0.050 0.090 0.150 0.250	V
$V_{BE(sat)}$	Base - Emitter Saturation Voltage (Note 3) ( $I_C = 1.0 \text{ A}$ , $I_B = 0.1 \text{ A}$ )	-	-	1.0	V
$V_{BE(on)}$	Base - Emitter Turn-on Voltage (Note 3) ( $I_C = 1.0 \text{ A}$ , $V_{CE} = 2.0 \text{ V}$ )	-	-	0.90	V
$f_T$	Cutoff Frequency ( $I_C = 500 \text{ mA}$ , $V_{CE} = 10 \text{ V}$ , $f = 100 \text{ MHz}$ )	-	120	-	MHz
$C_{ibo}$	Input Capacitance ( $V_{EB} = 5.0 \text{ V}$ , $f = 1.0 \text{ MHz}$ )	-	360	-	pF
$C_{obo}$	Output Capacitance ( $V_{CB} = 10 \text{ V}$ , $f = 1.0 \text{ MHz}$ )	-	30	-	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  $\mu\text{sec}$ , Duty Cycle  $\leq 2\%$ .

# NSV1C301CT

## TYPICAL CHARACTERISTICS

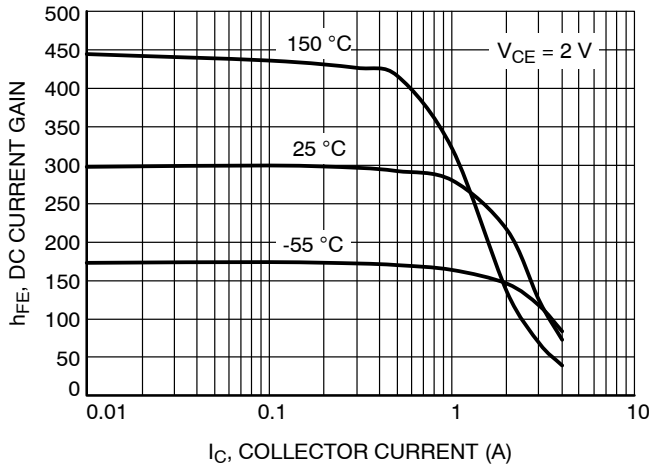


Figure 1. DC Current Gain

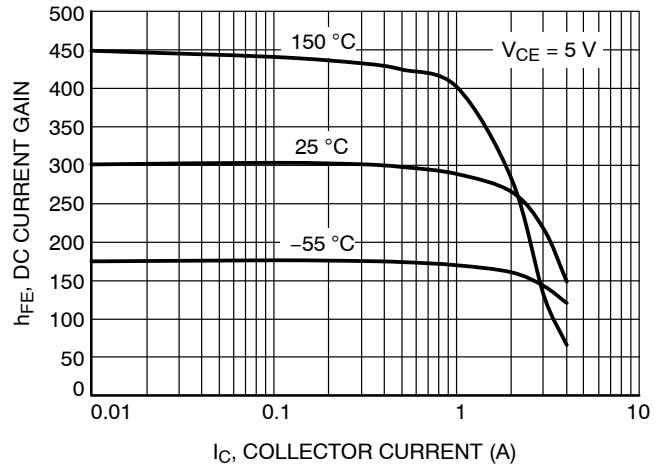


Figure 2. DC Current Gain

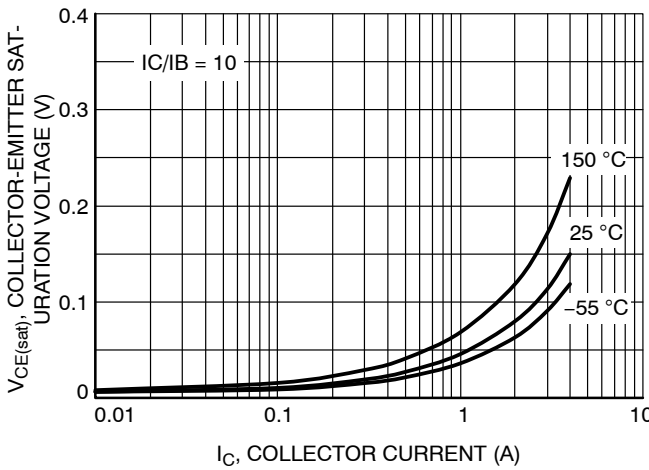


Figure 3. Collector-Emitter Saturation Voltage

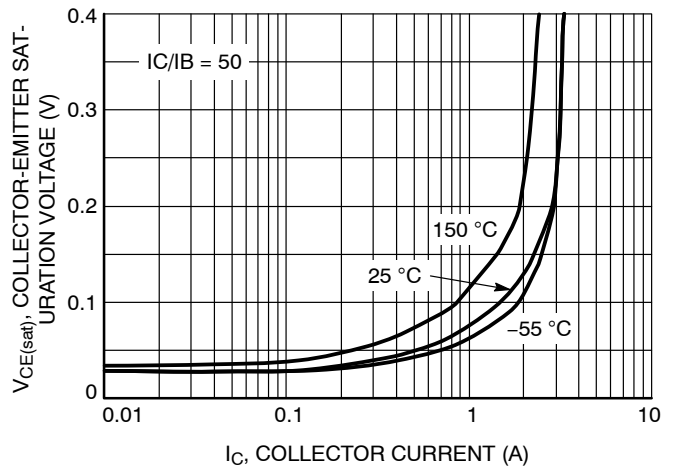


Figure 4. Collector-Emitter Saturation Voltage

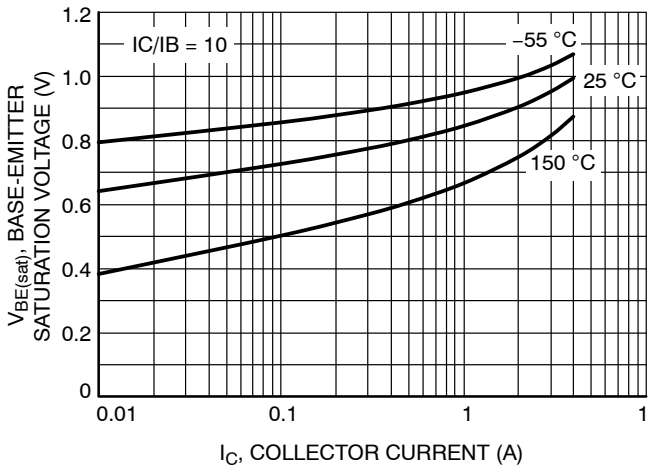


Figure 5. Base-Emitter Saturation Voltage

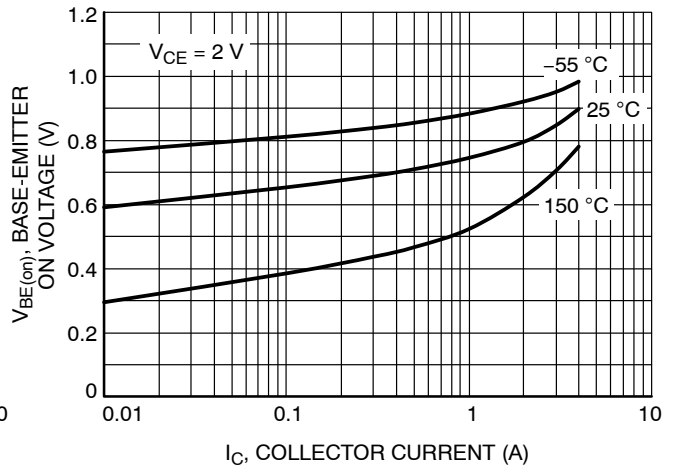


Figure 6. Base-Emitter "On" Voltage

# NSV1C301CT

## TYPICAL CHARACTERISTICS (continued)

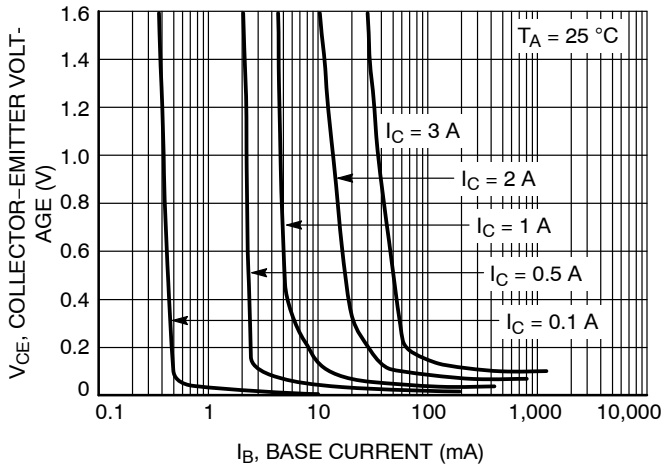


Figure 7. Collector Saturation Region

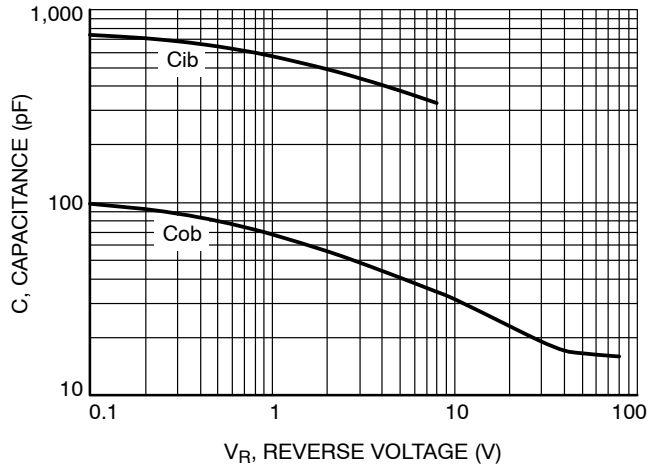


Figure 8. Capacitance

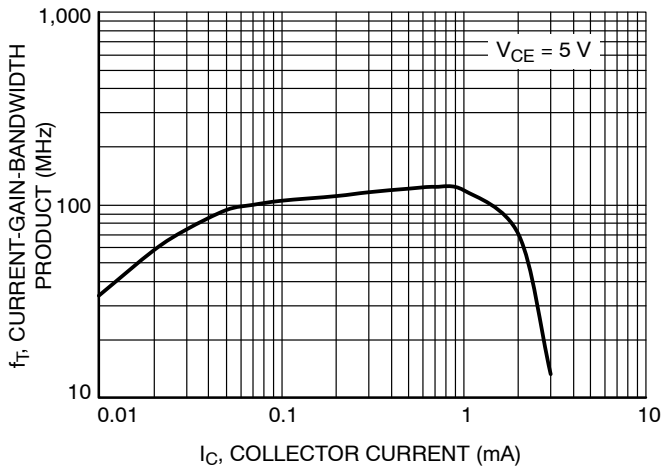


Figure 9. Current-Gain-Bandwidth Product

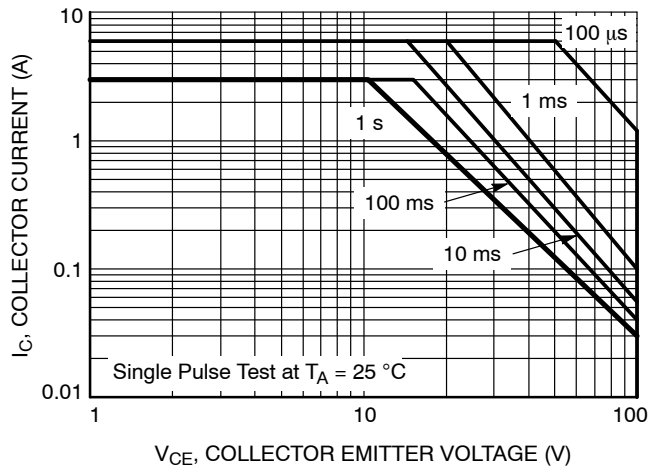


Figure 10. Safe Operating Area

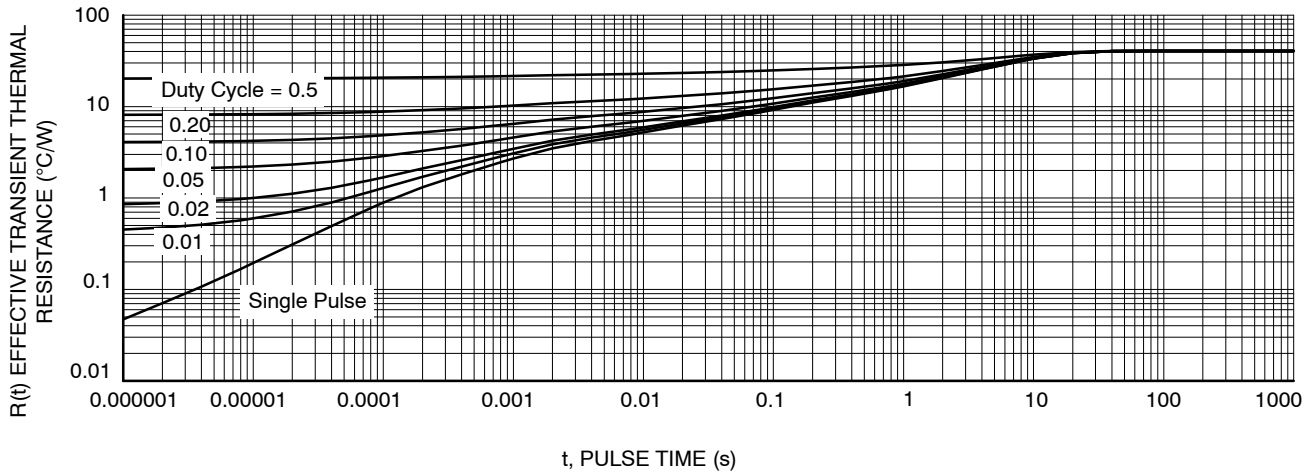


Figure 11. Typical Transient Thermal Response, Junction-to-Ambient

# NSV1C301CT

## ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
NSS1C301CTWG	LFP4K4 5x6 (Pb-Free)	3,000 / Tape & Reel
NSV1C301CTWG*	LFP4K 5x6 (Pb-Free)	3,000 / Tape & Reel

† 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

# NSV1C301CT

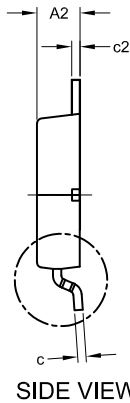
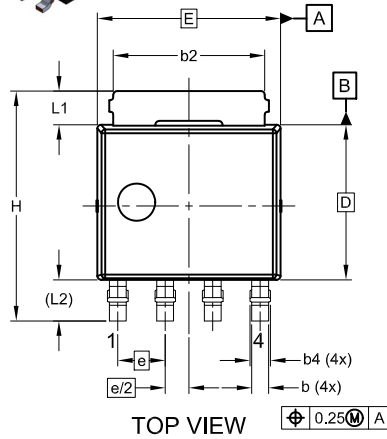
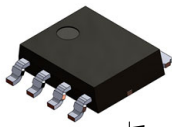
## REVISION HISTORY

Revision	Description of Changes	Date
2	Replace curve and title on Fig 11 + Rebranded the Data Sheet to <b>onsemi</b> format.	5/14/2026

This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.

LFLPAK4 4.90x4.15x1.15MM, 1.27P  
CASE 760AB  
ISSUE D

DATE 22 MAY 2024

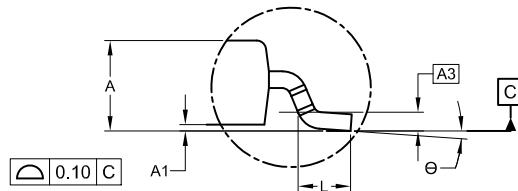


NOTES:

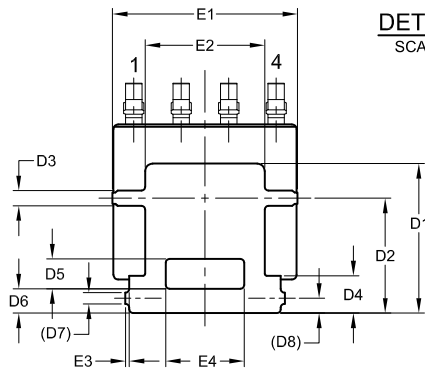
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.150mm PER SIDE.
4. DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.

TOP VIEW  $\text{M} \begin{matrix} \text{A} \\ 0.25 \end{matrix}$

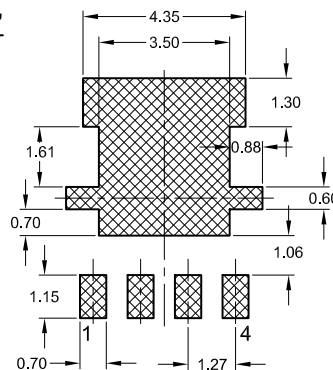
SIDE VIEW



DETAIL 'A'  
SCALE: 2:1



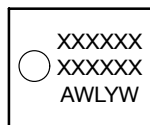
BOTTOM VIEW



RECOMMENDED LAND PATTERN

\*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ONSEMI SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

GENERIC MARKING DIAGRAM\*



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

\*This information is generic. Please refer to device data sheet for actual part marking. Some products may not follow the Generic Marking.

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 BSC		
b	0.40	0.45	0.50
b2	3.80	4.10	4.40
b4	0.45	0.55	0.65
c	0.19	0.22	0.25
c2	0.19	0.22	0.25
D	4.15 BSC		
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
D5	0.70	0.80	0.90
D6	0.55	0.65	0.75
D7	0.31 REF		
D8	0.40 REF		
E	4.90 BSC		
E1	4.85	4.95	5.05
E2	3.10	3.20	3.30
E3	0.00	0.10	0.20
E4	2.00	2.10	2.20
e	1.27 BSC		
e/2	0.635 BSC		
e1	0.40 REF		
H	6.00	6.15	6.30
L	0.50	0.70	0.90
L1	0.80	0.90	1.00
L2	1.10 REF		
Θ	0°	4°	8°

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DESCRIPTION:	LFLPAK4 4.90x4.15x1.15MM, 1.27P	PAGE 1 OF 1

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