NJL3281D (NPN)
NJL1302D (PNP)

Complementary ThermalTrak™ Transistors

The ThermalTrak family of devices has been designed to eliminate thermal equilibrium lag time and bias trimming in audio amplifier applications. They can also be used in other applications as transistor die protection devices.

Features

- Thermally Matched Bias Diode
- Instant Thermal Bias Tracking
- Absolute Thermal Integrity
- High Safe Operating Area
- Pb−Free Packages are Available*

Benefits

- Eliminates Thermal Equilibrium Lag Time and Bias Trimming
- Superior Sound Quality Through Improved Dynamic Temperature Response
- Significantly Improved Bias Stability
- Simplified Assembly
  - Reduced Labor Costs
  - Reduced Component Count
- High Reliability

Applications

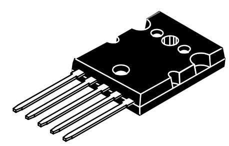
- High−End Consumer Audio Products
  - Home Amplifiers
  - Home Receivers
- Professional Audio Amplifiers
  - Theater and Stadium Sound Systems
  - Public Address Systems (PAs)

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

ON Semiconductor®

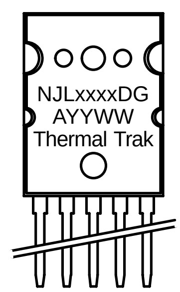
http://onsemi.com

BIPOLAR POWER TRANSISTORS
15 AMP, 260 VOLT, 200 WATT

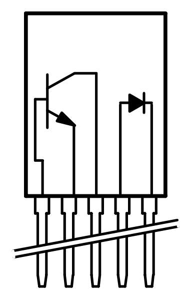


TO−264, 5 LEAD
CASE 340AA
STYLE 1

MARKING DIAGRAM



SCHEMATIC



NJLxxxxD	= Device Code xxxx = 3281 or 1302
G	= Pb−Free Package
A	= Assembly Location
YY	= Year
WW	= Work Week

ORDERING INFORMATION

Device	Package	Shipping
NJL3281D	TO−264	25 Units / Rail
NJL3281DG	TO−264 (Pb−Free)	25 Units / Rail
NJL1302D	TO−264	25 Units / Rail
NJL1302DG	TO−264 (Pb−Free)	25 Units / Rail

June, 2006 − Rev. 2
Publication Order Number:
NJL3281D/D

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Collector−Emitter Voltage	V_{CEO}	260	Vdc
Collector−Base Voltage	V_{CBO}	260	Vdc
Emitter−Base Voltage	V_{EBO}	5	Vdc
Collector−Emitter Voltage − 1.5 V	V_{CEX}	260	Vdc
Collector Current − Continuous − Peak (Note 1)	I_C	15 25	Adc
Base Current − Continuous	I_B	1.5	Adc
Total Power Dissipation @ T_C = 25°C Derate Above 25°C	P_D	200 1.43	W W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	− 65 to +150	°C
DC Blocking Voltage	V_R	200	V
Average Rectified Forward Current	$I_{F(AV)}$	1.0	A

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction−to−Case	$R_{\theta JC}$	0.625	°C/W

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Pulse Test: Pulse Width = 5 ms, Duty Cycle < 10%.

ATTRIBUTES

Characteristic	Value
ESD Protection — Human Body Model Machine Model	>8000 V > 400 V
Flammability Rating	UL 94 V−0 @ 0.125 in

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector−Emitter Sustaining Voltage (I_C = 100 mAdc, I_B = 0)	$V_{CEO(sus)}$	260	–	Vdc
Collector Cutoff Current (V_{CB} = 260 Vdc, I_E = 0)	I_{CBO}	–	50	μAdc
Emitter Cutoff Current (V_{EB} = 5 Vdc, I_C = 0)	I_{EBO}	–	5	μAdc
ON CHARACTERISTICS				
DC Current Gain (I_C = 500 mAdc, V_{CE} = 5 Vdc) (I_C = 1 Adc, V_{CE} = 5 Vdc) (I_C = 3 Adc, V_{CE} = 5 Vdc) (I_C = 5 Adc, V_{CE} = 5 Vdc) (I_C = 8 Adc, V_{CE} = 5 Vdc)	h_{FE}	 75 75 75 75 45	 150 150 150 150 –	
Collector−Emitter Saturation Voltage (I_C = 10 Adc, I_B = 1 Adc)	$V_{CE(sat)}$	–	3	Vdc
DYNAMIC CHARACTERISTICS				
Current−Gain − Bandwidth Product (I_C = 1 Adc, V_{CE} = 5 Vdc, f_{test} = 1 MHz)	f_T	30	–	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f_{test} = 1 MHz)	C_{ob}	–	600	pF
Maximum Instantaneous Forward Voltage (Note 2) (i_F = 1.0 A, T_J = 25°C) (i_F = 1.0 A, T_J = 150°C)	v_F	 1.1 0.93		V
Maximum Instantaneous Reverse Current (Note 2) (Rated dc Voltage, T_J = 25°C) (Rated dc Voltage, T_J = 150°C)	i_R	 10 100		μA
Maximum Reverse Recovery Time (i_F = 1.0 A, di/dt = 50 A/μs)	t_{rr}	100		ns

2. Diode Pulse Test: Pulse Width = 300 μs, Duty Cycle ≤ 2.0%.

TYPICAL CHARACTERISTICS

PNP NJL1302D

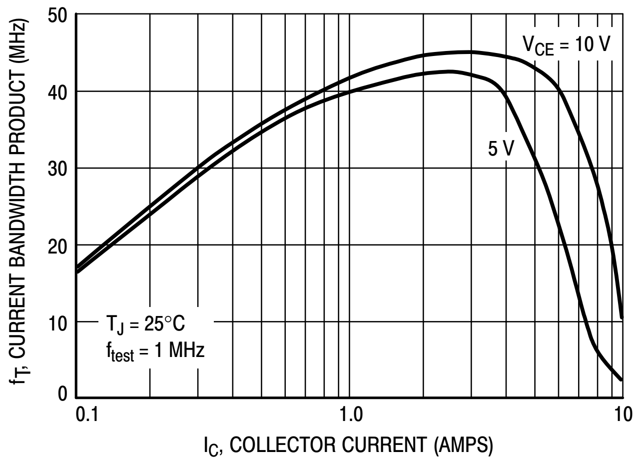


Figure 1. Typical Current Gain Bandwidth Product

NPN NJL3281D

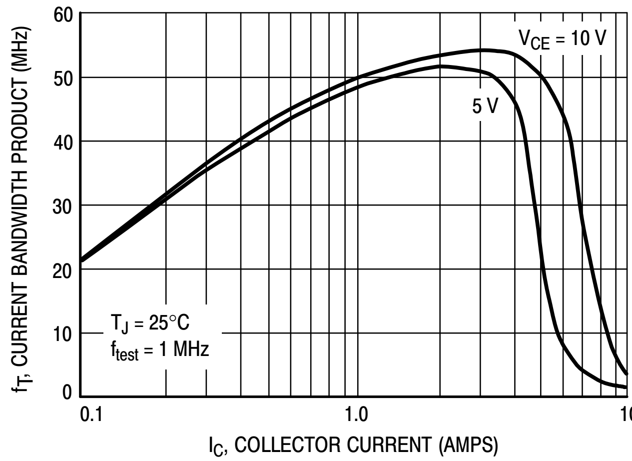


Figure 2. Typical Current Gain Bandwidth Product

PNP NJL1302D

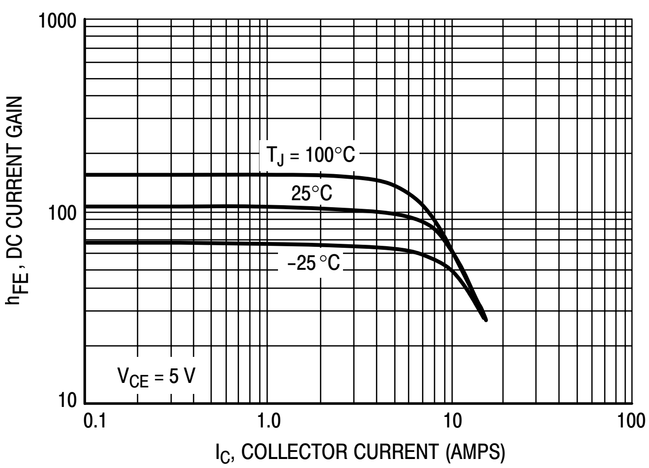


Figure 3. DC Current Gain, V_{CE} = 5 V

NPN NJL3281D

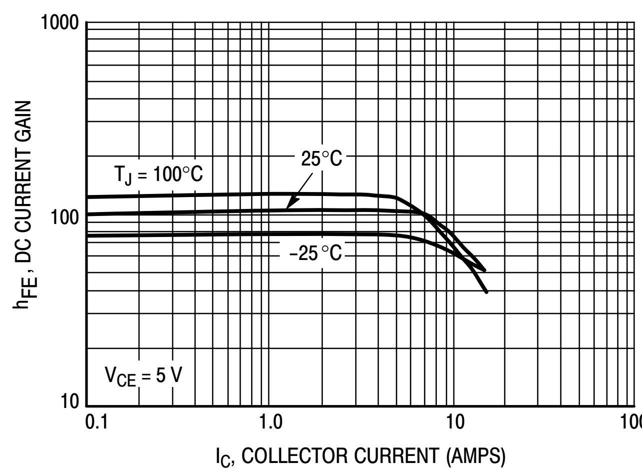


Figure 4. DC Current Gain, V_{CE} = 5 V

PNP NJL1302D

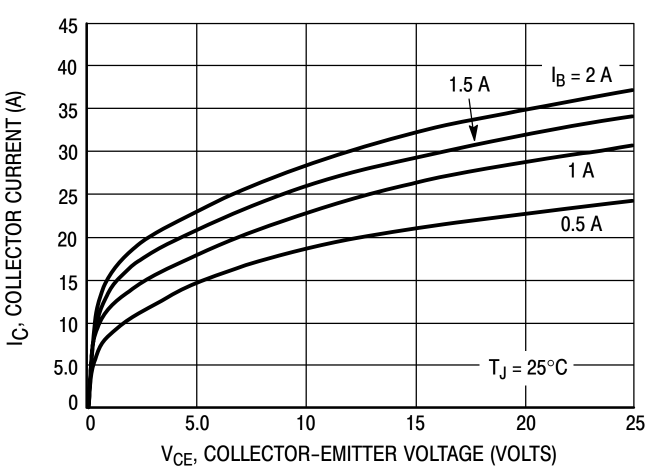


Figure 5. Typical Output Characteristics

NPN NJL3281D

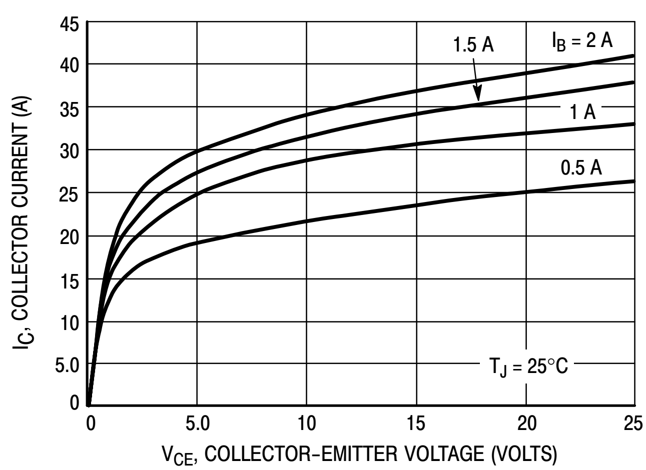


Figure 6. Typical Output Characteristics

TYPICAL CHARACTERISTICS

PNP NJL1302D

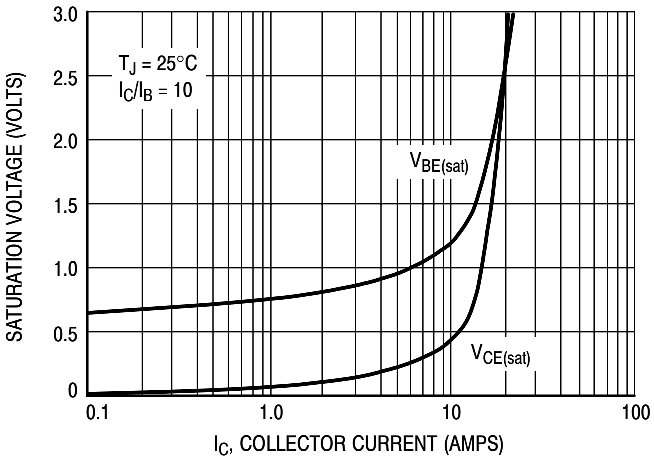


Figure 7. Typical Saturation Voltages

NPN NJL3281D

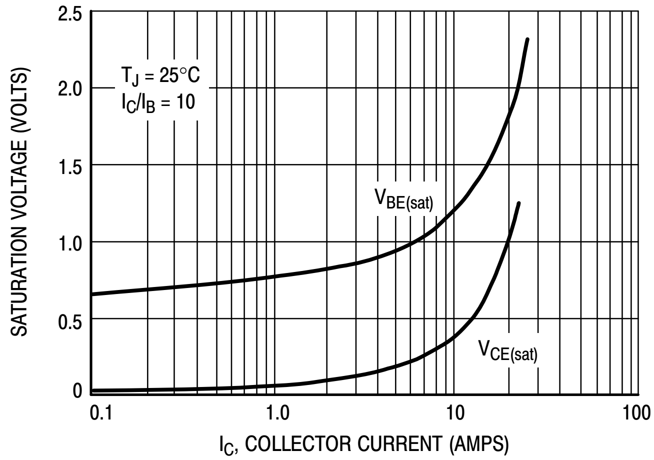


Figure 8. Typical Saturation Voltages

PNP NJL1302D

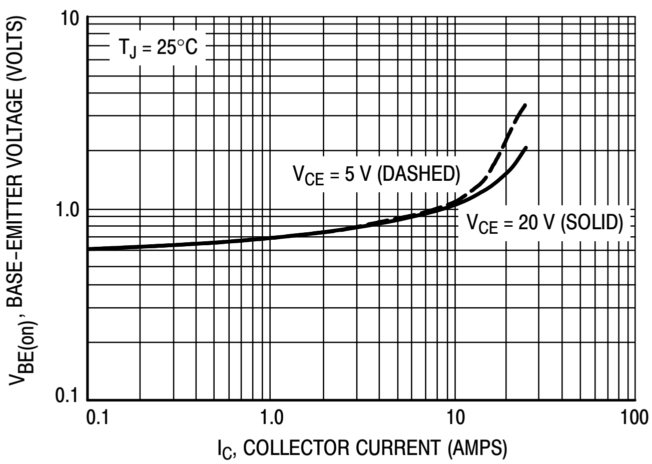


Figure 9. Typical Base−Emitter Voltage

NPN NJL3281D

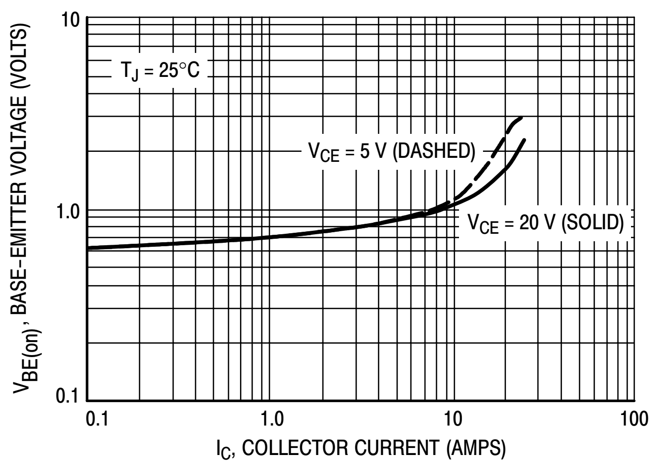


Figure 10. Typical Base−Emitter Voltage

TYPICAL CHARACTERISTICS

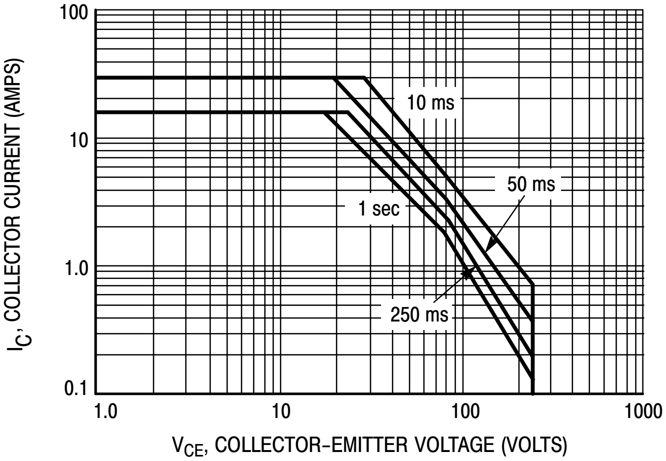


Figure 11. Active Region Safe Operating Area

There are two limitations on the power handling ability of a transistor; average junction temperature and secondary breakdown. Safe operating area curves indicate $I_C - V_{CE}$ limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 11 is based on $T_{J(pk)} = 150°C$; T_C is variable depending on conditions. At high case temperatures, thermal limitations will reduce the power than can be handled to values less than the limitations imposed by second breakdown.

PNP NJL1302D

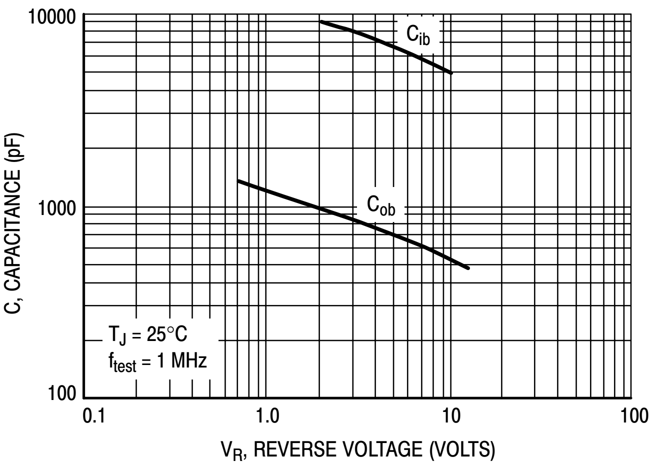


Figure 12. NJL1302D Typical Capacitance

NPN NJL3281D

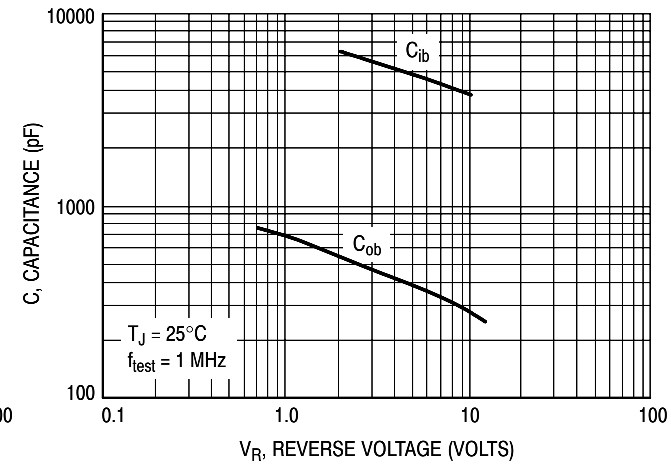


Figure 13. NJL3281D Typical Capacitance

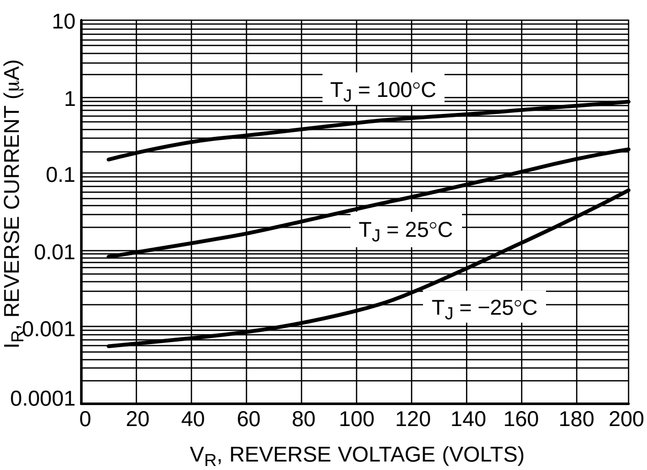


Figure 14. Typical Reverse Current

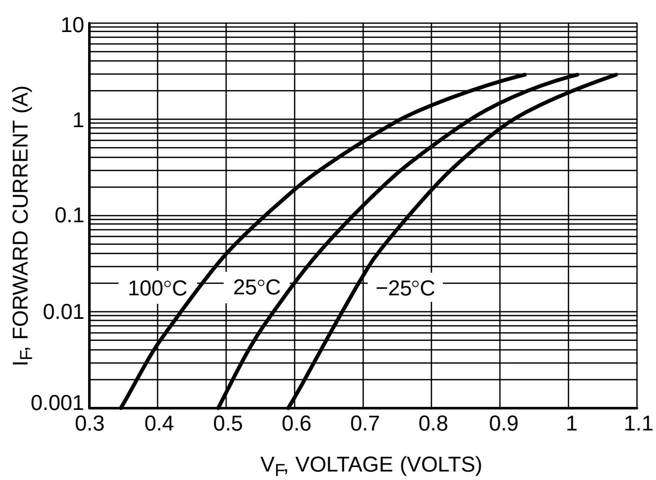
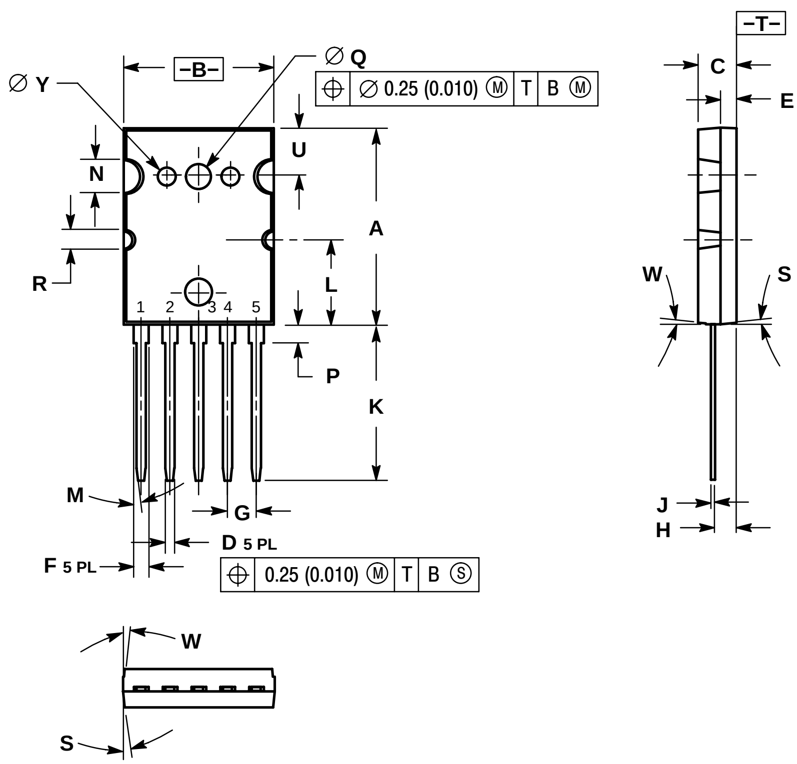


Figure 15. Typical Forward Voltage

PACKAGE DIMENSIONS

TO−264, 5 LEAD
CASE 340AA−01
ISSUE O



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	25.857	25.984	26.111	1.018	1.023	1.028
B	19.761	19.888	20.015	0.778	0.783	0.788
C	4.928	5.055	5.182	0.194	0.199	0.204
D	1.219 BSC			0.0480 BSC		
E	2.032	2.108	2.184	0.0800	0.0830	0.0860
F	1.981 BSC			0.0780 BSC		
G	3.81 BSC			0.150 BSC		
H	2.667	2.718	2.769	0.1050	0.1070	0.1090
J	0.584 BSC			0.0230 BSC		
K	20.422	20.549	20.676	0.804	0.809	0.814
L	11.28 REF			0.444 REF		
M	0 °	−−−	7 °	0 °	−−−	7 °
N	4.57 REF			0.180 REF		
P	2.259	2.386	2.513	0.0889	0.0939	0.0989
Q	3.480 BSC			0.1370 BSC		
R	2.54 REF			0.100 REF		
S	0 °	−−−	8 °	0 °	−−−	8 °
U	6.17 REF			0.243 REF		
W	0 °	−−−	6 °	0 °	−−−	6 °
Y	2.388 BSC			0.0940 BSC		

STYLE 1:
PIN 1. BASE
2. EMITTER
3. COLLECTOR
4. ANODE
5. CATHODE

PUBLICATION ORDERING INFORMATION

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- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.

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