Silicon Power Transistors

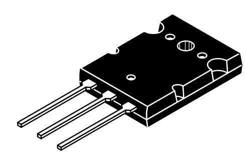
The MJL21193 and MJL21194 utilize Perforated Emitter technology and are specifically designed for high power audio output, disk head positioners and linear applications.

- Total Harmonic Distortion Characterized
- High DC Current Gain – h_{FE} = 25 Min @ I_C = 8 Adc
- Excellent Gain Linearity
- High SOA: 2.25 A, 80 V, 1 Second

PNP
MJL21193*
NPN
MJL21194*

*ON Semiconductor Preferred Device

16 AMPERE COMPLEMENTARY SILICON POWER TRANSISTORS 250 VOLTS 200 WATTS



CASE 340G–02
TO–3PBL

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CEO}	250	Vdc
Collector–Base Voltage	V_{CBO}	400	Vdc
Emitter–Base Voltage	V_{EBO}	5	Vdc
Collector–Emitter Voltage – 1.5 V	V_{CEX}	400	Vdc
Collector Current — Continuous Peak (1)	I_C	16 30	Adc
Base Current – Continuous	I_B	5	Adc
Total Power Dissipation @ T_C = 25°C Derate Above 25°C	P_D	200 1.43	Watts W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.7	°C/W

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

Characteristic	Symbol	Min	Typical	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Sustaining Voltage (I_C = 100 mAdc, I_B = 0)	$V_{CEO(sus)}$	250	—	—	Vdc
Collector Cutoff Current (V_{CE} = 200 Vdc, I_B = 0)	I_{CEO}	—	—	100	μAdc

(1) Pulse Test: Pulse Width = 5.0 μs, Duty Cycle ≤10%.

(continued)

Preferred devices are ON Semiconductor recommended choices for future use and best overall value.

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

Characteristic	Symbol	Min	Typical	Max	Unit
OFF CHARACTERISTICS					
Emitter Cutoff Current (V_{CE} = 5 Vdc, I_C = 0)	I_{EBO}	—	—	100	μAdc
Collector Cutoff Current (V_{CE} = 250 Vdc, $V_{BE(off)}$ = 1.5 Vdc)	I_{CEX}	—	—	100	μAdc
SECOND BREAKDOWN					
Second Breakdown Collector Current with Base Forward Biased	$I_{S/b}$				Adc
(V_{CE} = 50 Vdc, t = 1 s (non–repetitive)		4.0	—	—	
(V_{CE} = 80 Vdc, t = 1 s (non–repetitive)		2.25	—	—	
ON CHARACTERISTICS					
DC Current Gain	h_{FE}				
(I_C = 8 Adc, V_{CE} = 5 Vdc)		25	—	75	
(I_C = 16 Adc, I_B = 5 Adc)		8	—	—	
Base–Emitter On Voltage (I_C = 8 Adc, V_{CE} = 5 Vdc)	$V_{BE(on)}$	—	—	2.2	Vdc
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$				Vdc
(I_C = 8 Adc, I_B = 0.8 Adc)		—	—	1.4	
(I_C = 16 Adc, I_B = 3.2 Adc)		—	—	4	
DYNAMIC CHARACTERISTICS					
Total Harmonic Distortion at the Output	T_{HD}				%
V_{RMS} = 28.3 V, f = 1 kHz, P_{LOAD} = 100 W_{RMS} — h_{FE} unmatched		—	0.8	—	
(Matched pair h_{FE} = 50 @ 5 A/5 V) — h_{FE} matched		—	0.08	—	
Current Gain Bandwidth Product (I_C = 1 Adc, V_{CE} = 10 Vdc, f_{test} = 1 MHz)	f_T	4	—	—	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f_{test} = 1 MHz)	C_{ob}	—	—	500	pF

(1) Pulse Test: Pulse Width = 300 μs, Duty Cycle ≤2%

PNP MJL21193

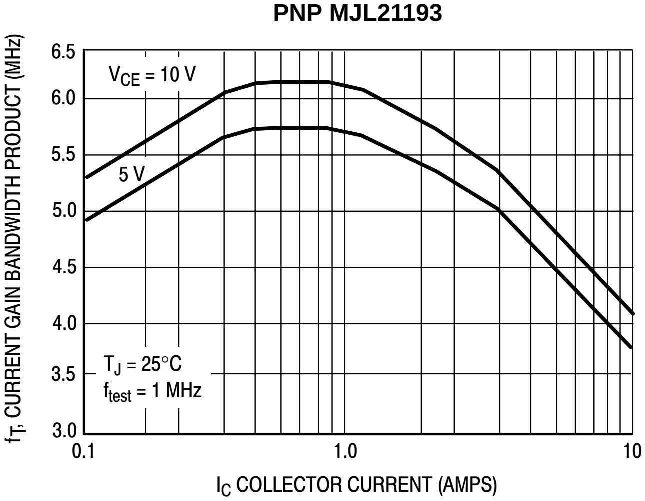


Figure 1. Typical Current Gain Bandwidth Product

NPN MJL21194

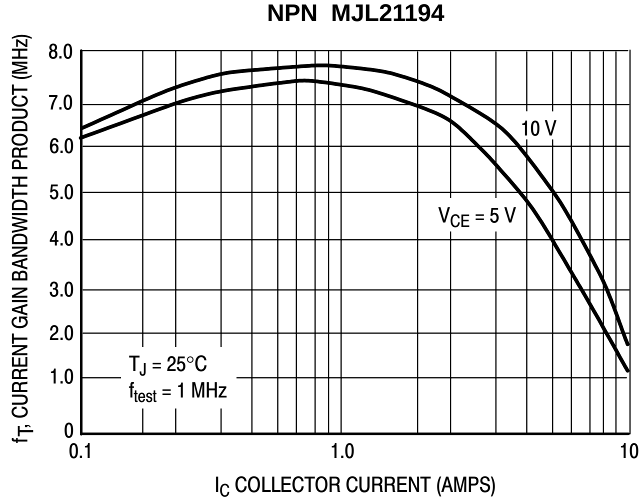


Figure 2. Typical Current Gain Bandwidth Product

TYPICAL CHARACTERISTICS

PNP MJL21193

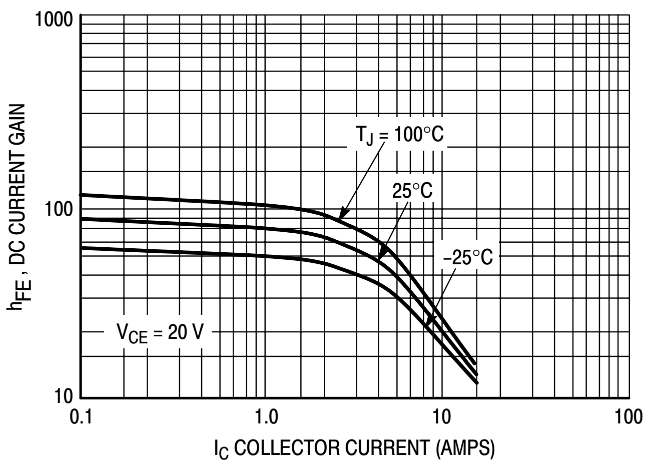


Figure 3. DC Current Gain, V_{CE} = 20 V

NPN MJL21194

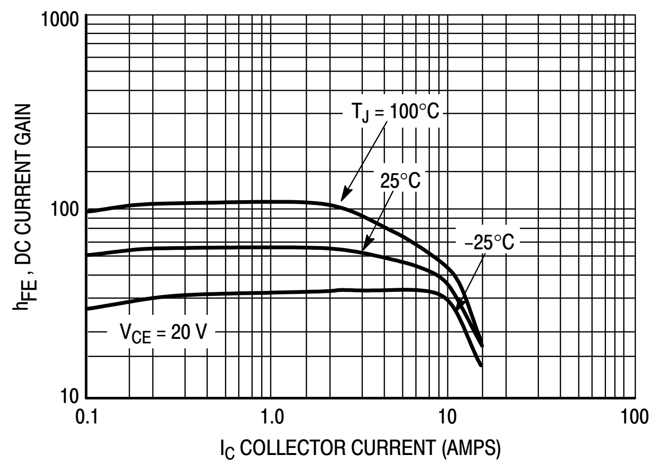


Figure 4. DC Current Gain, V_{CE} = 20 V

PNP MJL21193

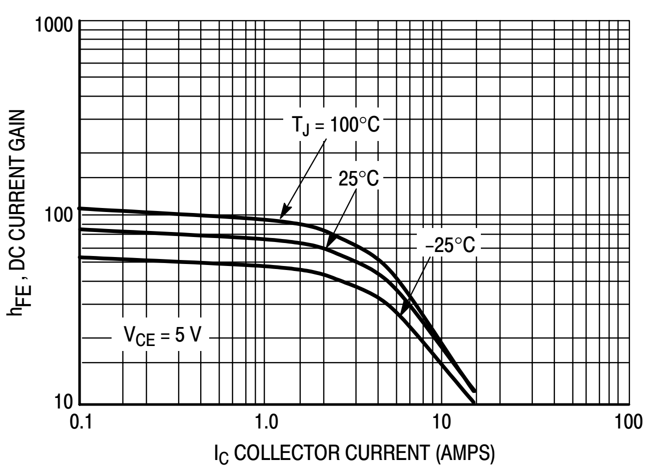


Figure 5. DC Current Gain, V_{CE} = 5 V

NPN MJL21194

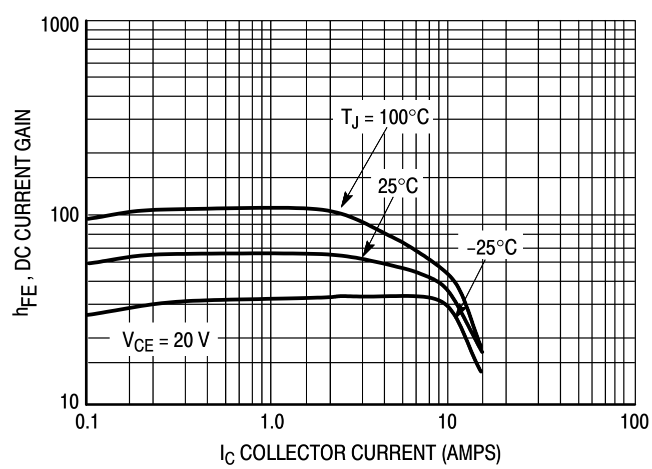
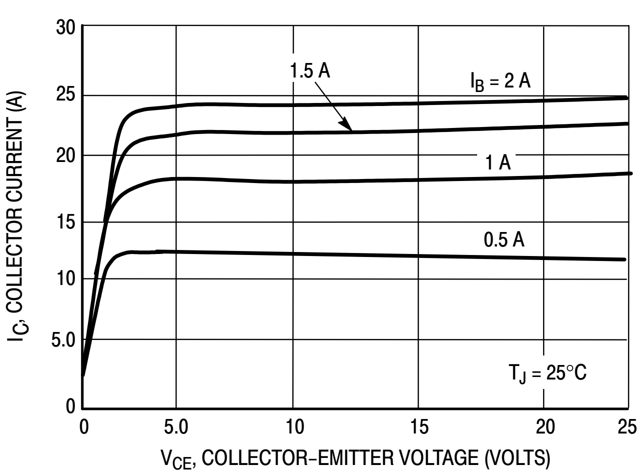
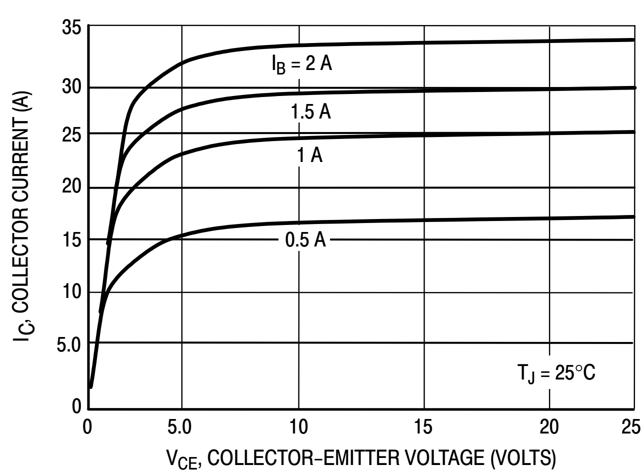


Figure 6. DC Current Gain, V_{CE} = 5 V

PNP MJL21193



NPN MJL21194



TYPICAL CHARACTERISTICS

PNP MJL21193

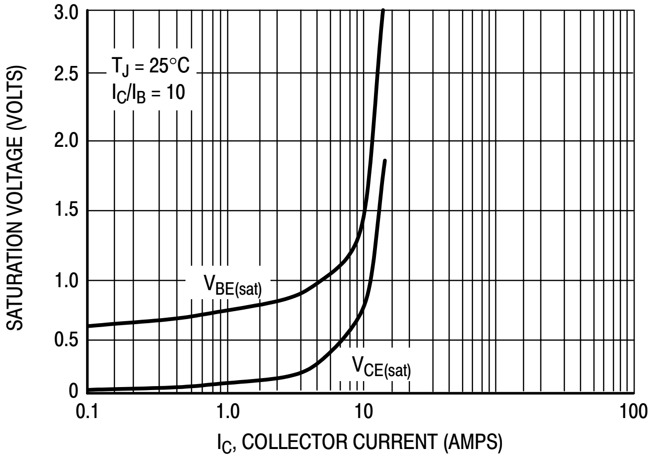


Figure 9. Typical Saturation Voltages

NPN MJL21194

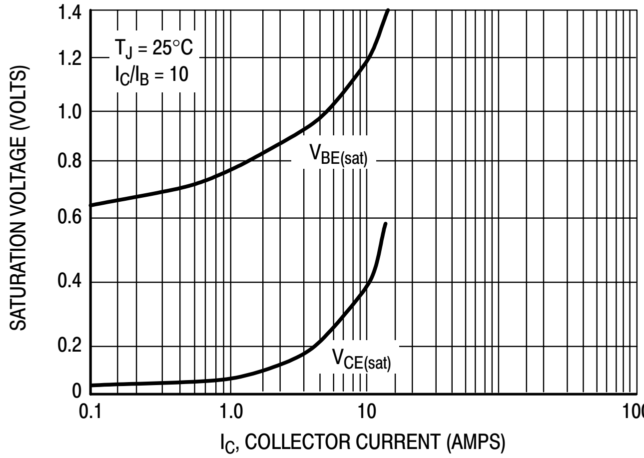


Figure 10. Typical Saturation Voltages

PNP MJL21193

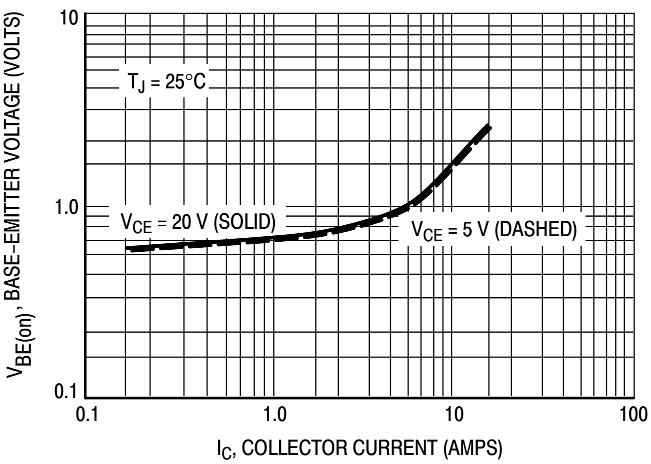


Figure 11. Typical Base–Emitter Voltage

NPN MJL21194

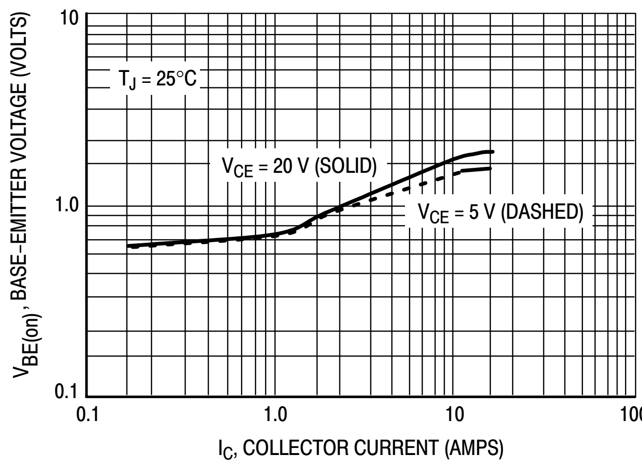


Figure 12. Typical Base–Emitter Voltage

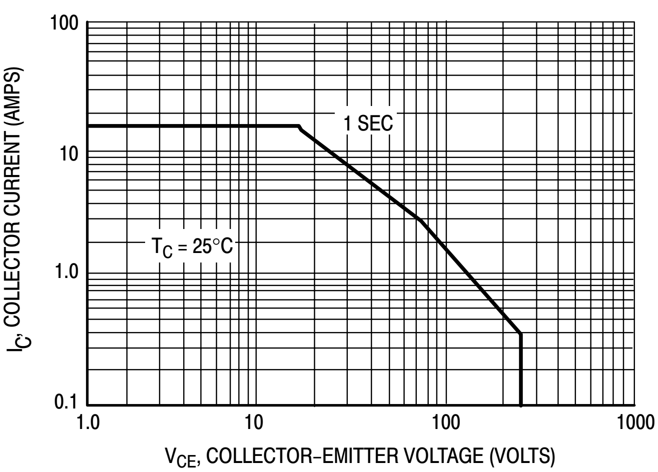


Figure 13. Active Region Safe Operating Area

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 13 is based on $T_{J(pk)}$ = 200°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.

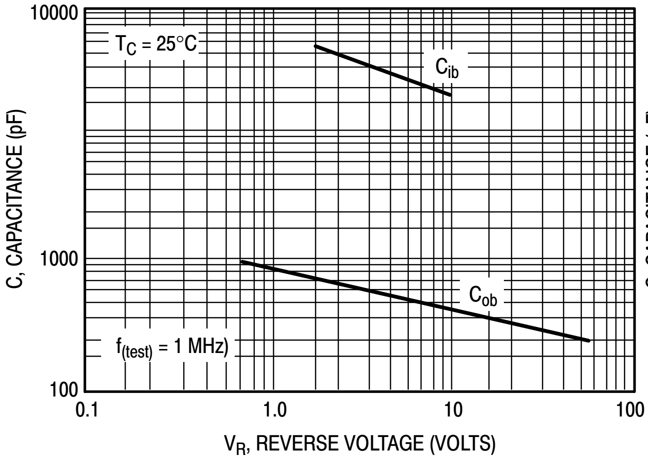


Figure 14. MJL21193 Typical Capacitance

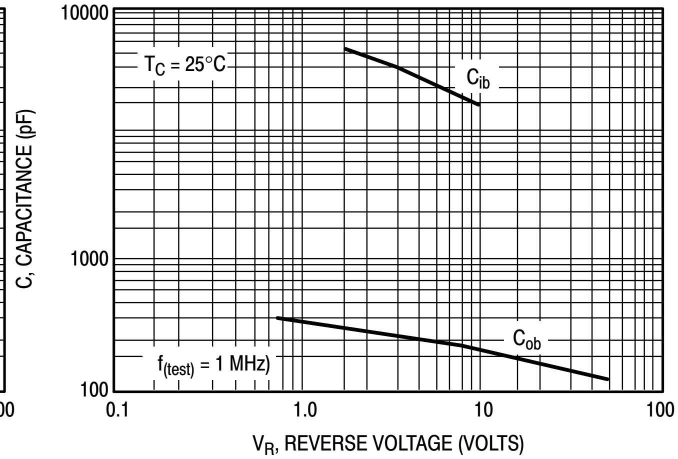


Figure 15. MJL21194 Typical Capacitance

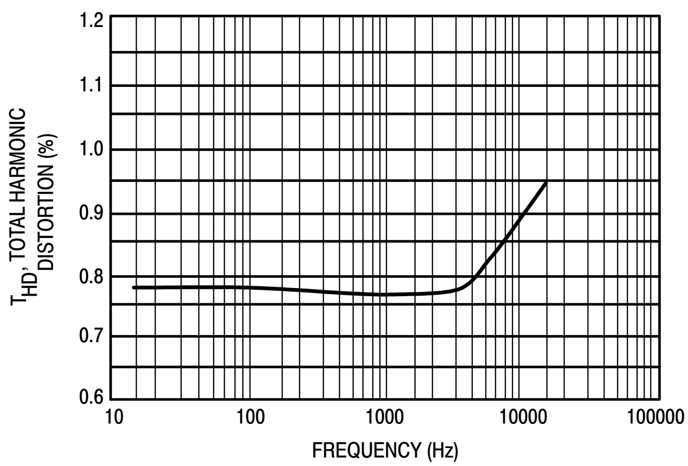


Figure 16. Typical Total Harmonic Distortion

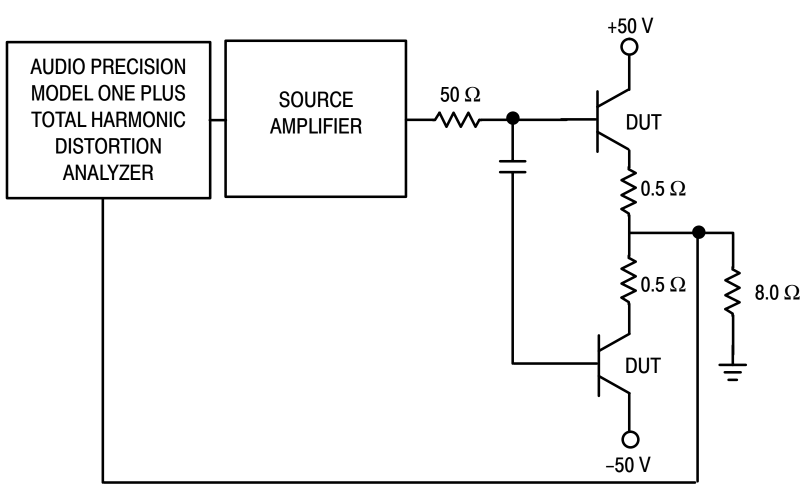
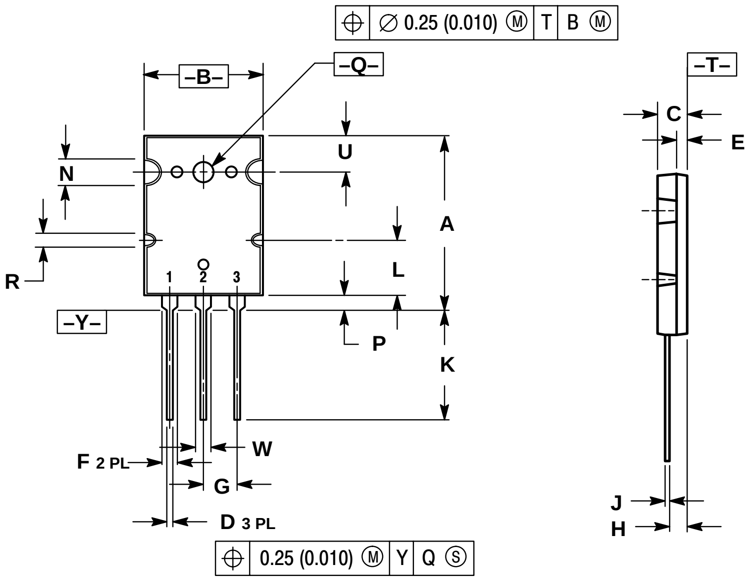


Figure 17. Total Harmonic Distortion Test Circuit

PACKAGE DIMENSIONS

TO–3PBL (TO–264)
CASE 340G–02
ISSUE H

SCALE 1:2



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

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	28.0	29.0	1.102	1.142
B	19.3	20.3	0.760	0.800
C	4.7	5.3	0.185	0.209
D	0.93	1.48	0.037	0.058
E	1.9	2.1	0.075	0.083
F	2.2	2.4	0.087	0.102
G	5.45 BSC		0.215 BSC	
H	2.6	3.0	0.102	0.118
J	0.43	0.78	0.017	0.031
K	17.6	18.8	0.693	0.740
L	11.0	11.4	0.433	0.449
N	3.95	4.75	0.156	0.187
P	2.2	2.6	0.087	0.102
Q	3.1	3.5	0.122	0.137
R	2.15	2.35	0.085	0.093
U	6.1	6.5	0.240	0.256
W	2.8	3.2	0.110	0.125

Notes

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