PNP - 2N6040, 2N6042, NPN - 2N6043, 2N6045

Plastic Medium-Power Complementary Silicon Transistors

Plastic medium−power complementary silicon transistors are designed for general−purpose amplifier and low−speed switching applications.

Features

- High DC Current Gain – h_{FE} = 2500 (Typ) @ I_C = 4.0 Adc
- Collector−Emitter Sustaining Voltage – @ 100 mAdc –
  $V_{CEO(sus)}$ = 60 Vdc (Min) – 2N6040, 2N6043
  = 100 Vdc (Min) – 2N6042, 2N6045
- Low Collector−Emitter Saturation Voltage –
  $V_{CE(sat)}$ = 2.0 Vdc (Max) @ I_C = 4.0 Adc – 2N6043,44
  = 2.0 Vdc (Max) @ I_C = 3.0 Adc – 2N6042, 2N6045
- Monolithic Construction with Built−In Base−Emitter Shunt Resistors
- Epoxy Meets UL 94 V−0 @ 0.125 in
- ESD Ratings: Human Body Model, 3B > 8000 V
  Machine Model, C > 400 V
- Pb−Free Packages are Available*

MAXIMUM RATINGS (Note 1)

Rating		Symbol	Value	Unit
Collector−Emitter Voltage	2N6040 2N6043 2N6042 2N6045	V_{CEO}	60 100	Vdc
Collector−Base Voltage	2N6040 2N6043 2N6042 2N6045	V_{CB}	60 100	Vdc
Emitter−Base Voltage		V_{EB}	5.0	Vdc
Collector Current	Continuous Peak	I_C	8.0 16	Adc
Base Current		I_B	120	mAdc
Total Power Dissipation @ T_C = 25°C Derate above 25°C		P_D	75 0.60	W W/°C
Operating and Storage Junction Temperature Range		T_J, T_{stg}	−65 to +150	°C

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.

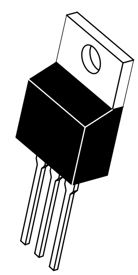
1. Indicates JEDEC Registered Data.

*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®

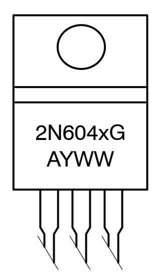
http://onsemi.com

DARLINGTON, 8 AMPERES COMPLEMENTARY SILICON POWER TRANSISTORS 60 – 100 VOLTS, 75 WATTS



TO−220AB
CASE 221A−09
STYLE 1

MARKING DIAGRAM



2N604x	= Device Code x = 0, 2, 3, or 5
A	= Assembly Location
Y	= Year
WW	= Work Week
G	= Pb−Free Package

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction–to–Case	θ_{JC}	1.67	°C/W
Thermal Resistance, Junction–to–Ambient	θ_{JA}	57	°C/W

*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)	 2N6040, 2N6043 2N6042, 2N6045	$V_{CEO(sus)}$	 60 100	 – –	Vdc
Collector Cutoff Current (V_{CE} = 60 Vdc, I_B = 0) (V_{CE} = 100 Vdc, I_B = 0)	 2N6040, 2N6043 2N6042, 2N6045	I_{CEO}	 – –	 20 20	μA
Collector Cutoff Current (V_{CE} = 60 Vdc, $V_{BE(off)}$ = 1.5 Vdc) (V_{CE} = 100 Vdc, $V_{BE(off)}$ = 1.5 Vdc) (V_{CE} = 60 Vdc, $V_{BE(off)}$ = 1.5 Vdc, T_C = 150°C) (V_{CE} = 80 Vdc, $V_{BE(off)}$ = 1.5 Vdc, T_C = 150°C) (V_{CE} = 100 Vdc, $V_{BE(off)}$ = 1.5 Vdc, T_C = 150°C)	 2N6040, 2N6043 2N6042, 2N6045 2N6040, 2N6043 2N6041, 2N6044 2N6042, 2N6045	I_{CEX}	 – – – – –	 20 20 200 200 200	μA
Collector Cutoff Current (V_{CB} = 60 Vdc, I_E = 0) (V_{CB} = 100 Vdc, I_E = 0)	 2N6040, 2N6043 2N6042, 2N6045	I_{CBO}	 – –	 20 20	μA
Emitter Cutoff Current (V_{BE} = 5.0 Vdc, I_C = 0)		I_{EBO}	–	2.0	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 4.0 Adc, V_{CE} = 4.0 Vdc) (I_C = 3.0 Adc, V_{CE} = 4.0 Vdc) (I_C = 8.0 Adc, V_{CE} = 4.0 Vdc)	 2N6040, 2N6043, 2N6042, 2N6045 All Types	h_{FE}	 1000 1000 100	 20.000 20,000 –	–
Collector–Emitter Saturation Voltage (I_C = 4.0 Adc, I_B = 16 mAdc) (I_C = 3.0 Adc, I_B = 12 mAdc) (I_C = 8.0 Adc, I_B = 80 Adc)	 2N6040, 2N6043, 2N6042, 2N6045 All Types	$V_{CE(sat)}$	 – – –	 2.0 2.0 4.0	Vdc
Base–Emitter Saturation Voltage (I_C = 8.0 Adc, I_B = 80 mAdc)		$V_{BE(sat)}$	–	4.5	Vdc
Base–Emitter On Voltage (I_C = 4.0 Adc, V_{CE} = 4.0 Vdc)		$V_{BE(on)}$	–	2.8	Vdc
DYNAMIC CHARACTERISTICS					
Small Signal Current Gain (I_C = 3.0 Adc, V_{CE} = 4.0 Vdc, f = 1.0 MHz)		$\lvert h_{fe} \rvert$	4.0	–	
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 0.1 MHz)	2N6040/2N6042 2N6043/2N6045	C_{ob}	– –	300 200	pF
Small–Signal Current Gain (I_C = 3.0 Adc, V_{CE} = 4.0 Vdc, f = 1.0 kHz)		h_{fe}	300	–	–

*Indicates JEDEC Registered Data.

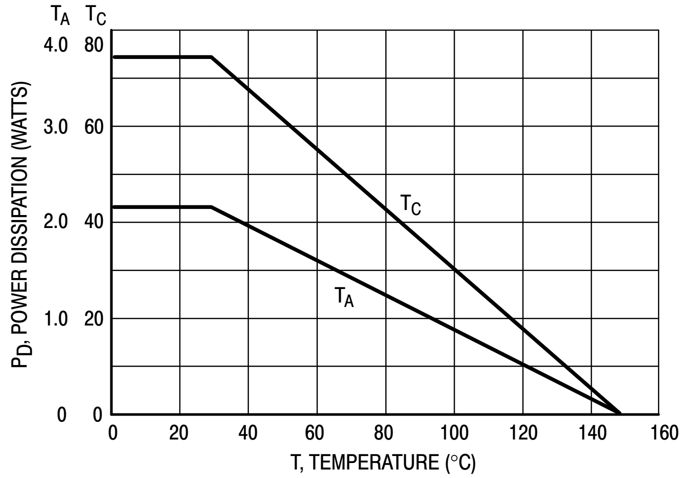


Figure 1. Power Derating

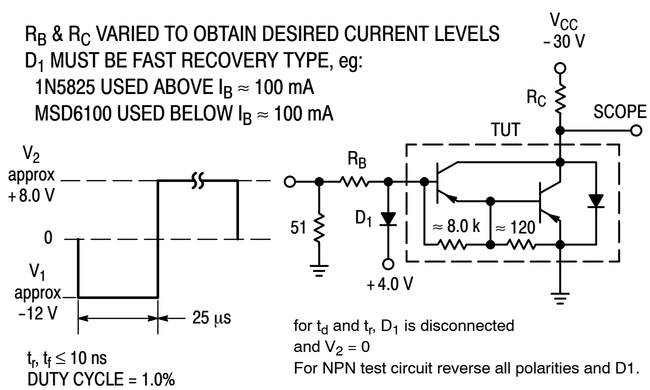


Figure 2. Switching Times Equivalent Circuit

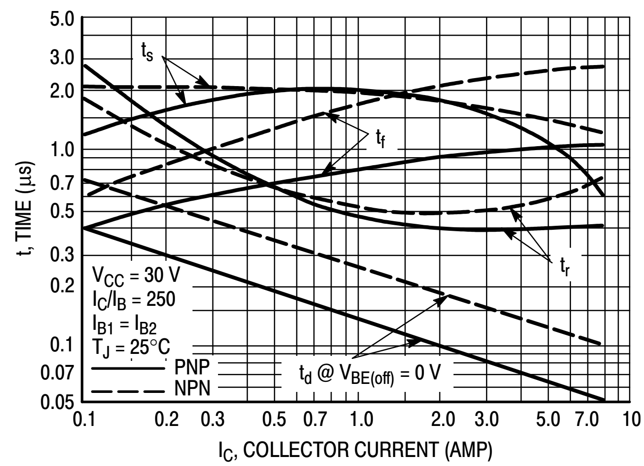


Figure 3. Switching Times

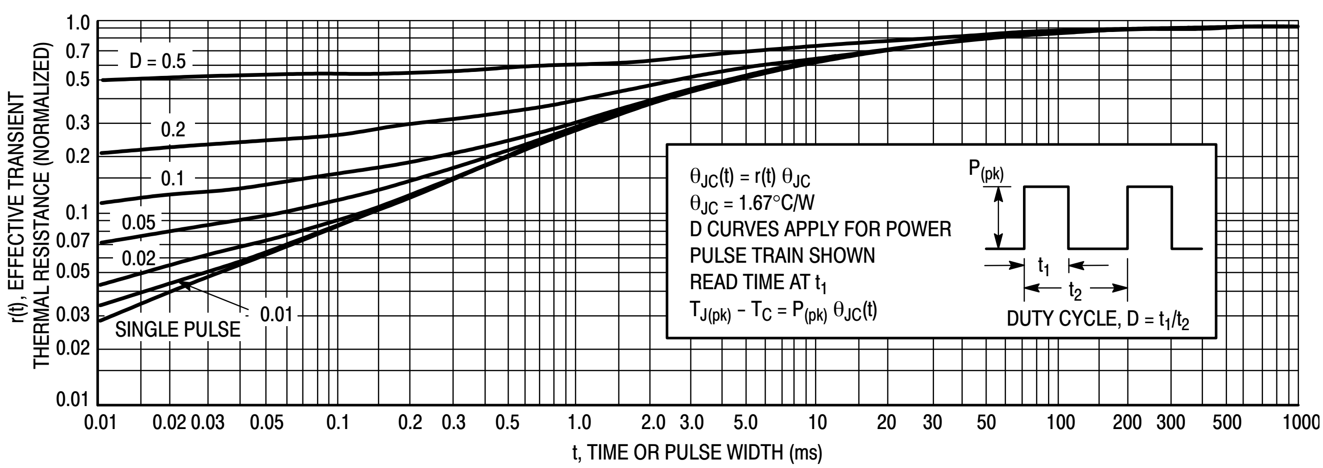


Figure 4. Thermal Response

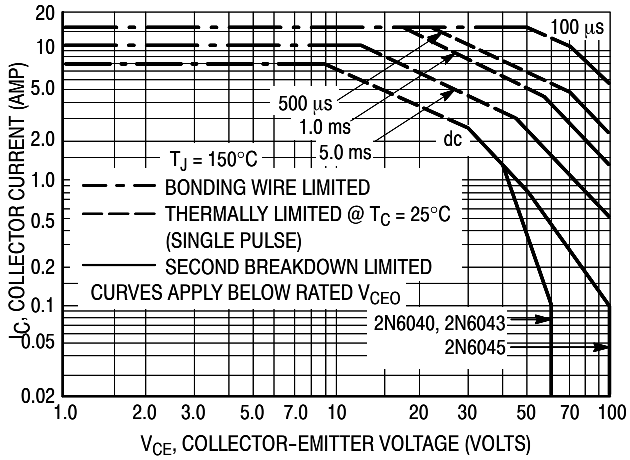


Figure 5. Active−Region Safe Operating Area

There are two limitations on the power handling ability of a transistor: average junction temperature and second 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 5 is based on $T_{J(pk)}$ = 150°C; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)}$ < 150°C. $T_{J(pk)}$ may be calculated from the data in Figure 4. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

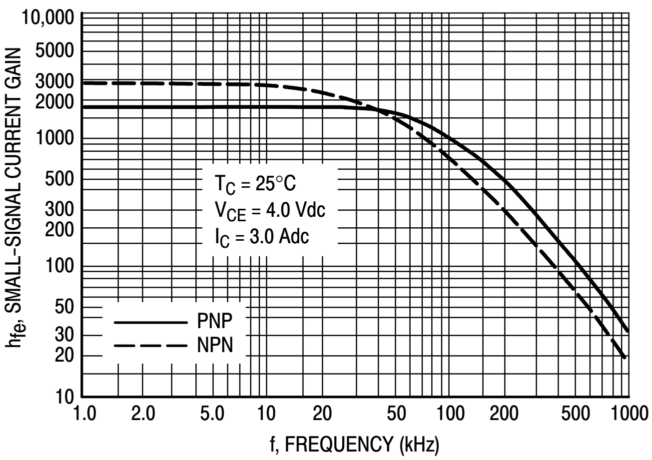


Figure 6. Small−Signal Current Gain

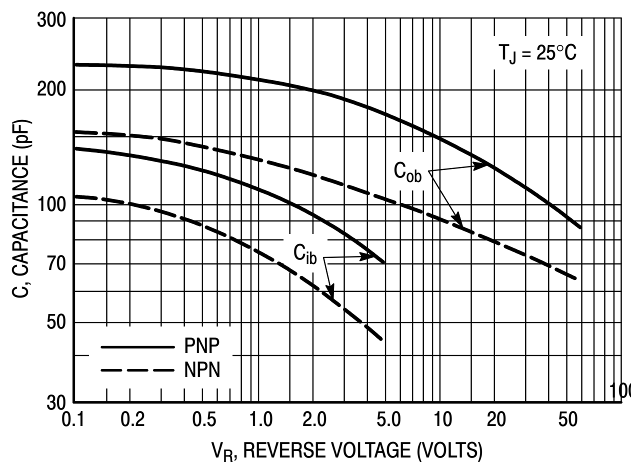


Figure 7. Capacitance

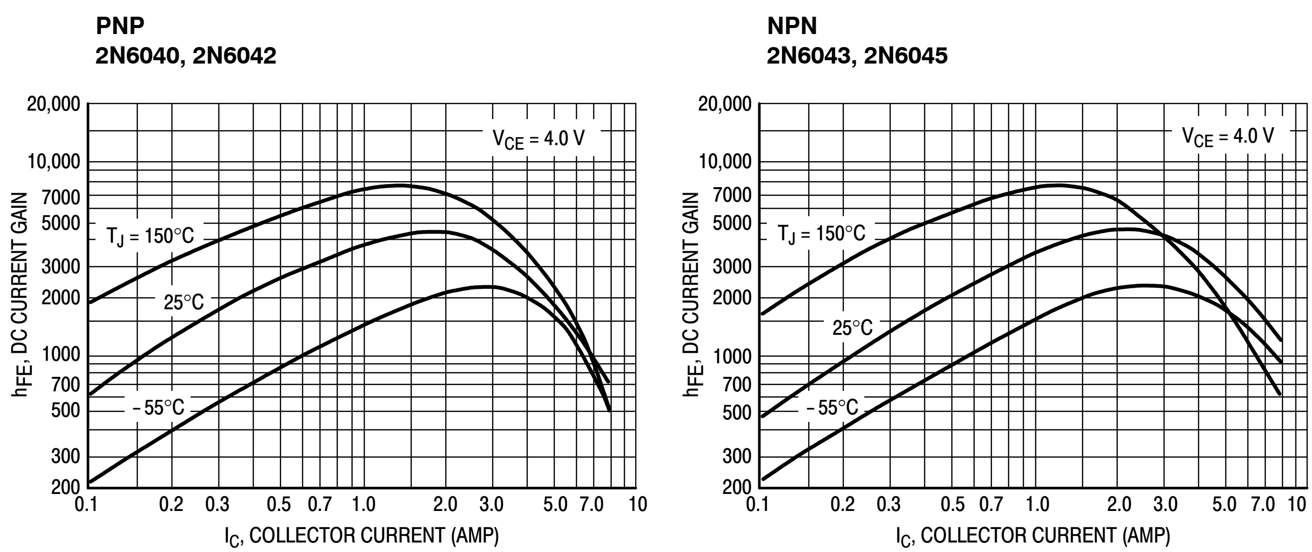


Figure 8. DC Current Gain

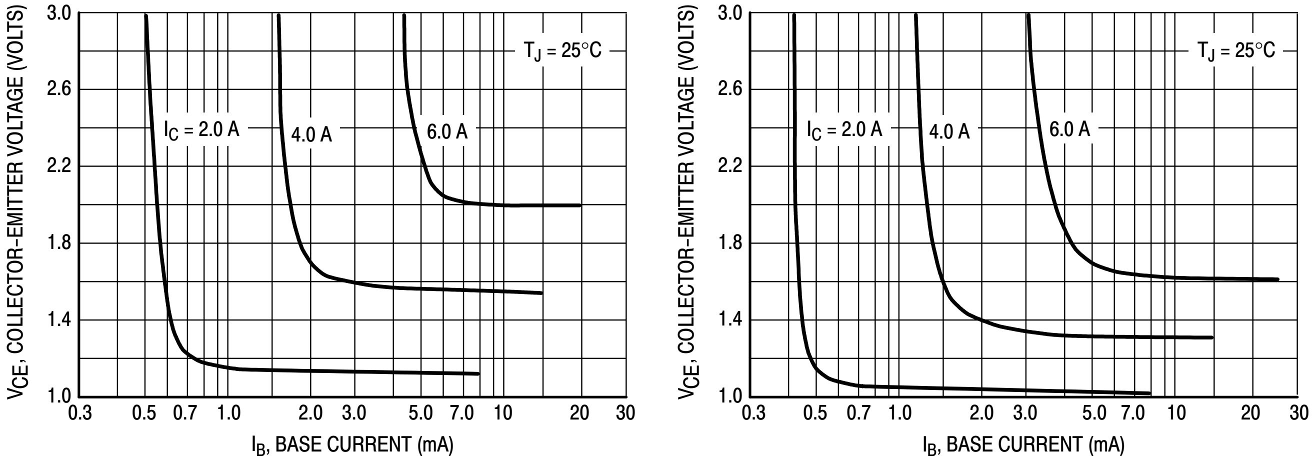


Figure 9. Collector Saturation Region

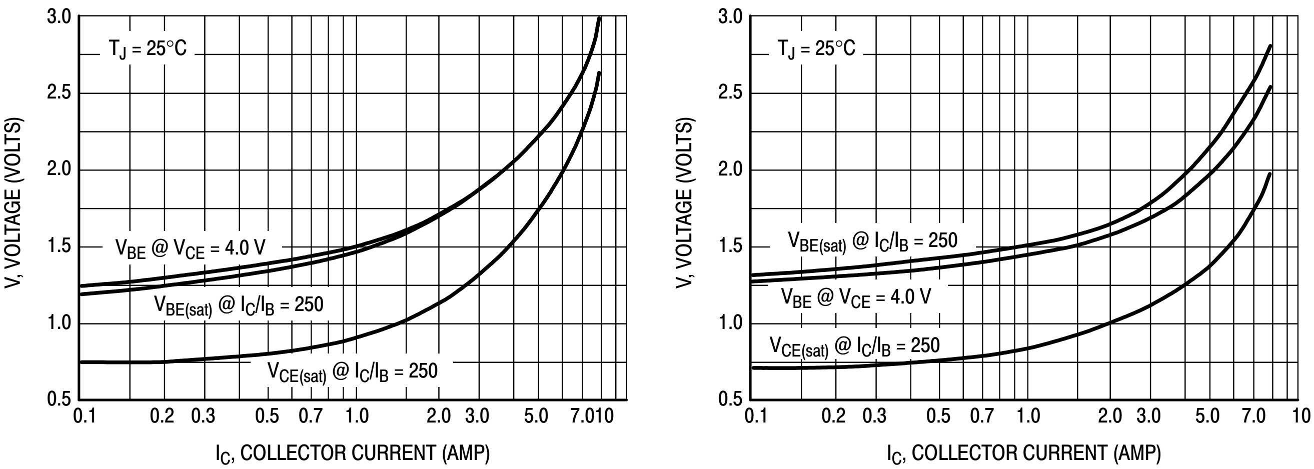


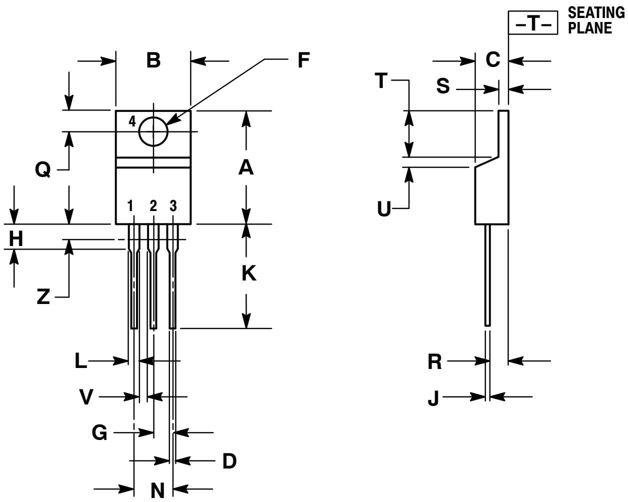
Figure 10. "On" Voltages

ORDERING INFORMATION

Device	Package	Shipping
2N6040	TO−220AB	50 Units / Rail
2N6040G	TO−220AB (Pb−Free)	
2N6042	TO−220AB	
2N6042G	TO−220AB (Pb−Free)	
2N6043	TO−220AB	
2N6043G	TO−220AB (Pb−Free)	
2N6045	TO−220AB	
2N6045G	TO−220AB (Pb−Free)	

PACKAGE DIMENSIONS

TO−220
CASE 221A−09
ISSUE AG



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.036	0.64	0.91
F	0.142	0.161	3.61	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.161	2.80	4.10
J	0.014	0.025	0.36	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	---	1.15	---
Z	---	0.080	---	2.04

STYLE 1:
PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
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