



PTP5027

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NPN Silicon Power Transistor
3.0 Amperes / 50 Watts

High Voltage and High Reliability

- High Speed Switching
- Wide SOA

TO-220
1. Base
2. Collector
3. Emitter



Absolute Maximum Ratings

TC=25°C unless otherwise noted

CHARACTERISTICS	SYMBOL	RATING	UNIT
Collector-Base Voltage	V_{CBO}	1100	V
Collector-Emitter Voltage	V_{CEO}	800	V
Emitter-Base Voltage	V_{EBO}	7	V
Collector Current(DC)	I_C	3	A
Collector Current(Pulse)	I_{CP}	10	A
Base Current	I_B	1.5	A
Collector Dissipation(Tc=25°C)	P_C	50	W
Junction Temperature	T_J	150	°C
Storage Temperature	T_{STG}	-55~150	°C

Electrical Characteristics

TC=25°C unless otherwise noted

CHARACTERISTICS	SYMBOL	Test Condition	Min	Typ.	Max	Unit
Collector-Base Breakdown Voltage	V_{CBO}	$I_C=1mA, I_E=0$	1100			V
Collector-Emitter Breakdown Voltage	V_{CEO}	$I_C=5mA, I_B=0$	800			V
Emitter-Base Breakdown Voltage	V_{EBO}	$I_E=1mA, I_C=0$	7			V
Collector-Emitter Sustaining Voltage	$I_{CEX}(sus)$	$I_C=1.5A, I_{B1}=-I_{B2}=0.3A$ $L=2mH, \text{Clamped}$	800			V
Collector Cutoff Current	I_{CBO}	$V_{CB}=800V, I_E=0$			10	μA
Emitter Cutoff Current	I_{EBO}	$V_{EB}=5V, I_C=0$			10	μA
DC Current Gain	h_{FE1} h_{FE2}	$V_{CE}=5V, I_C=0.2A$ $V_{CE}=5V, I_C=1A$	10 8		40	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=1.5A, I_B=0.3A$			2	V
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C=1.5A, I_B=0.3A$			1.5	V
Output Capacitance	C_{ob}	$V_{CB}=10V, I_E=0, f=0.1MHz$		60		pF
Current Gain Bandwidth Product	f_T	$V_{CE}=10V, I_C=0.2A$		15		MHz
Turn on Time	t_{on}	$V_{CC}=400V, I_C=5A$ $I_{B1}=-2.5A, I_{B2}=2A$ $R_L=200\Omega$			0.5	μS
Storage Time	t_{stg}				3.0	μS
Fall Time	t_f				0.3	μS

Note : h_{FE1} Classification N :10 ~ 20, R : 15 ~ 30, O : 20 ~ 40

Typical Characteristics

Figure 1. Static Characteristic

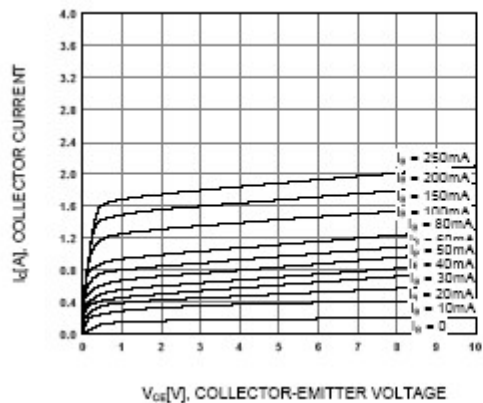


Figure 2. DC current Gain

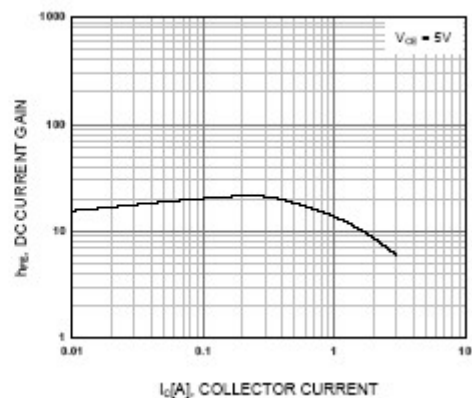
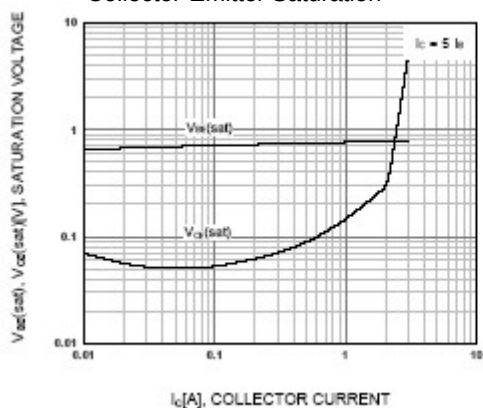
Figure 3. Base-Emitter Saturation Voltage
Collector-Emitter Saturation

Figure 4. Base-Emitter On Voltage

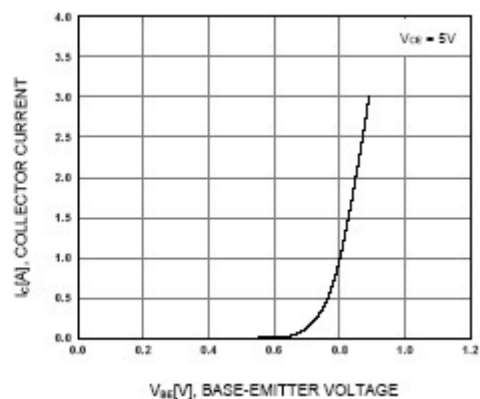


Figure 5. Switching Time

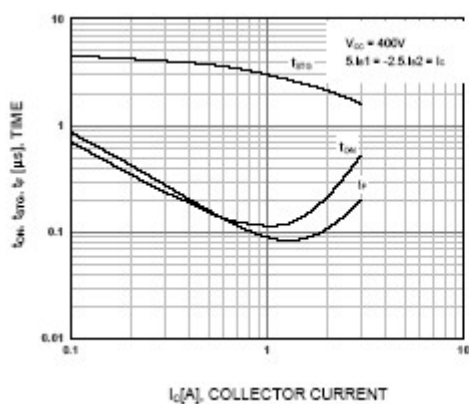
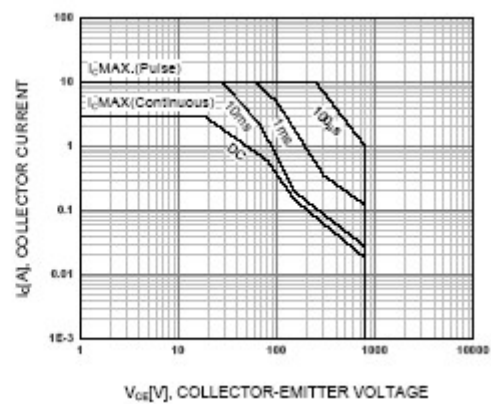


Figure 6. Safe Operating Area



Typical Characteristics (Continued)

Figure 7. Reverse Bias Operating Area

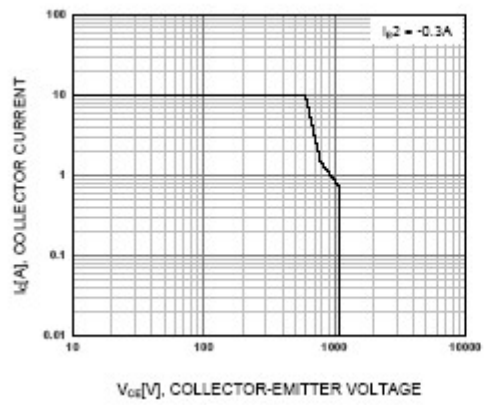
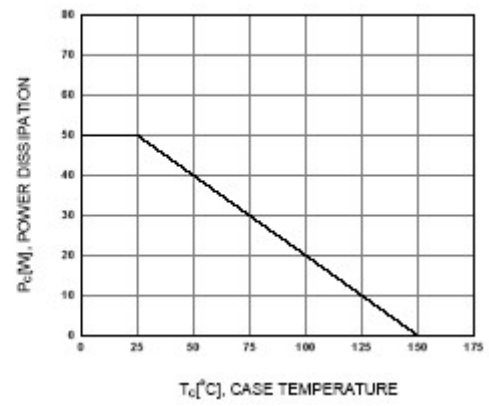
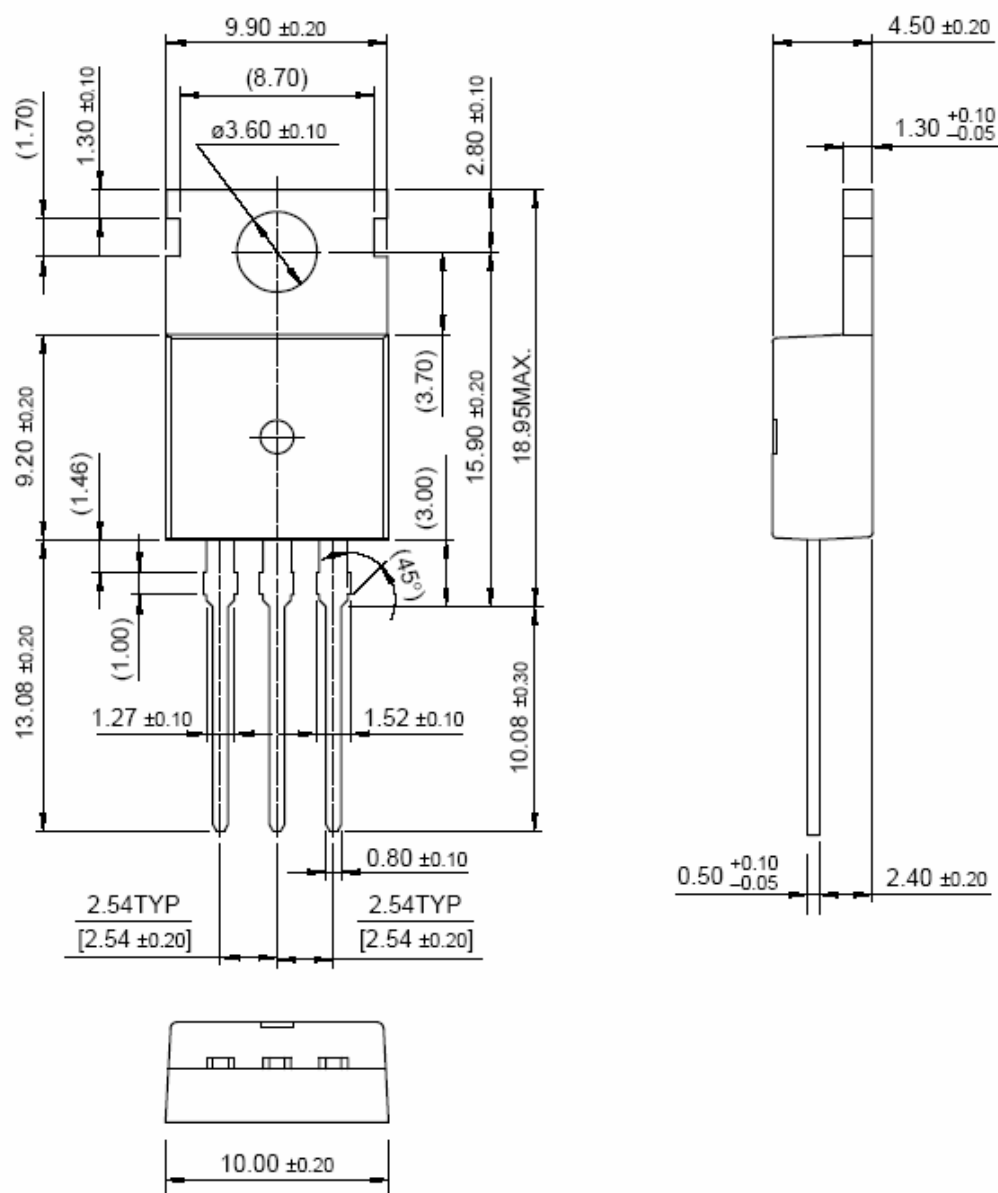


Figure 8. Power Derating



Package Dimensions

TO-220



Dimensions in Millimeters

Reliability Qualification

A. High Temperature Reverse Bias (HTRB)

The purpose of this test is to determine the sensitivity of the product to mobile ion contamination and related failure mechanisms.

Conditions: JESD22-A108, JIS C 7021 B-8

$T_A=150^{\circ}\text{C}$ $V_{CB}=80\%$ max rated V_{CB}

Sample Size	#of Fail	Cum. Fail%	168hrs	300hrs
45	0	0.0%	0	0

B. Pressure Cooker Test (PCT)

Autoclave (ACLV)

The purpose of this test is to evaluate the moisture resistance of non-hermetic components under pressure/temperature conditions.

Conditions: JESD22-A102, JIS C 7021 A-6

$T_A=121^{\circ}\text{C}$ RH=100% P=1 atmosphere (15psig)

Sample Size	#of Fail	Cum. Fail%	48hrs
45	0	0.0%	0

C. Temperature Humidity Bias (THBT)

The purpose of this test is to evaluate the moisture resistance of non-hermetic components.

The addition of voltage bias accelerates the corrosive effect after moisture penetration has taken place. with time, this is a catastrophically destructive test.

Conditions: JESD22-A101

$T_A=85^{\circ}\text{C}$ RH=85% $V_{CB}=80\%$ max rated V_{CB}

Sample Size	#of Fail	Cum. Fail%	168hrs	300hrs
45	0	0.0%	0	0

Reliability Qualification (Continued)**D. High Temperature Storage Life (HTSL)**

The purpose of this test is to expose time/temperature failure mechanisms and to evaluate long-term strong stability.

Conditions: JESD22-A103, JIS C 7021 B-10

$T_A = T_{stg}(max)$

Sample Size	#of Fail	Cum. Fail%	168hrs	300hrs
45	0	0.0%	0	0

E. Temperature Cycle Air-to Air (TMCL)

The purpose of this test is to evaluate the ability of the device to withstand both exposure to extreme temperature and the transition between temperature extreme, and to exposure excessive thermal mismatch between materials.

Conditions: JESD22-A104, JIS C 7021 A-4

Air to air, $-55^{\circ}\text{C} \sim 150^{\circ}\text{C}$, 15 minutes dwell time at each temperature

Sample Size	#of Fail	Cum. Fail%	100cycles	200cycles
45	0	0.0%	0	0