MOSPEC

NPN SILICON POWER TRANSISTORS

The 2N6676,2N6677and 2N6678 transistor are designed for high voltage switching applications such as:

NPN
2N6676
2N6677
2N6678

15 AMPERE
NPN SILICON
POWER TRANSISTORS
300-400 VOLTS
175 WATTS

FEATURES
*Off-Line Power Supplies
*Converter Circuits
*Pulse Width Modulated Regulators
Specification Feature-
High Voltage Capability
Fast Switching Speeds
Low Saturation Voltage

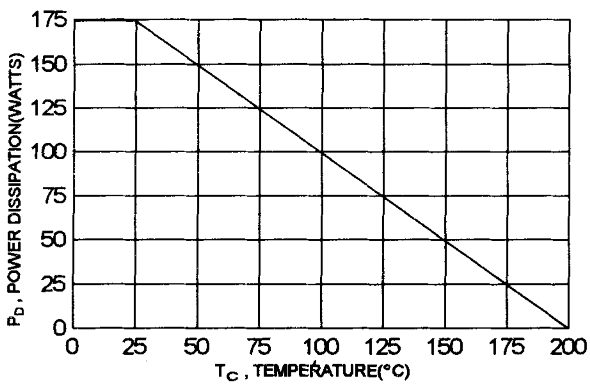
MAXIMUM RATINGS

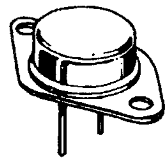
Characteristic	Symbol	2N6676	2N6677	2N6678	Unit
Collector-Emitter Voltage	V_{CEV}	450	550	650	V
Collector-Emitter Voltage	V_{CEX}	350	400	450	V
Collector-Emitter Voltage	V_{CEO}	300	350	400	V
Emitter-Base Voltage	V_{EBO}	8.0			V
Collector Current - Continuous - Peak	I_C I_{CM}	15 20			A
Base Current-Peak	I_B	5.0			A
Total Power Dissipation @T_C= 25°C Derate above 25°C	P_T	175 1.0			W W/°C
Operating and Storage Junction Temperature Range	T_J ,T_{STG}	-65 to +200			°C

THERMAL CHARACTERISTICS

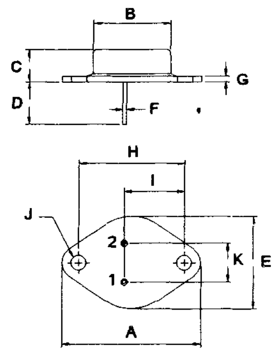
Characteristic	Symbol	Max	UNIT
Thermal Resistance Junction to Case	$R\theta jc$	1.0	°C/W

FIGURE -1 POWER DERATING





TO-3



PIN 1.BASE
2.EMITTER
COLLECTOR(CASE)

DIM	MILLIMETERS	
	MIN	MAX
A	38.75	39.96
B	19.28	22.23
C	7.96	9.28
D	11.18	12.19
E	25.20	26.67
F	0.92	1.09
G	1.38	1.62
H	29.90	30.40
I	16.64	17.30
J	3.88	4.36
K	10.67	11.18

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage(1) (I_C= 200 mA, I_B= 0) 2N6676 / 2N6677 / 2N6678	$V_{CEO(sus)}$	300 / 350 / 400		V
Collector Cutoff Current (V_{CE}= Rated V_{CEV}, $V_{BE(off)}$= -1.5V) (V_{CE}= Rated V_{CEV}, $V_{BE(off)}$=-1.5V,T_C= 100°C)	I_{CEV}		0.1 / 1.0	mA
Emitter Cutoff Current (V_{EB}= 8.0 V, I_C= 0)	I_{EBO}		2.0	mA
ON CHARACTERISTICS (1)				
DC Current Gain (I_C =15 A,V_{CE} = 3.0 V)	hFE	8.0		
Collector-Emitter Saturation Voltage (I_C =15 A , I_B= 3.0 A)	$V_{CE(sat)}$		1.5	V
Base-Emitter Saturation Voltage (I_C =15 A, I_B= 3.0 A)	$V_{BE(sat)}$		1.5	V
DYNAMIC CHARACTERISTICS				
Current - Gain - Bandwidth Product (2) (I_C=1.0 A, V_{CE}= 10 V, f = 5.0 MHz)	F_T	3.0		MHz
Output Capacitance (I_C= 1.0 A, V_{CB}= 10 V, f = 0.1 MHz)	C_{ob}		500	pF

SWITCHING CHARACTERISTICS

Characteristic	Conditions	Symbol	Min	Max	Unit
Delay Time	V_{CC}= 200V,I_C= 15A I_{B1}= I_{B2}= 3A,tp= 20us Duty Cycle ≤ 2% V_{BB}= 6V,R_L= 13.5Ω T_C= 25°C	t_d		0.2	us
Rise Time		t_r		0.6	us
Storage Time		t_s		2.5	us
Fall Time		t_f		0.6	us

(1) Pulse Test: Pulse width = 300 us , Duty Cycle ≤ 2.0%
(2) $f_T = |h_{fe}| \circ f_{test}$

FIG-2 FORWARD BAIAS SAFE OPERATING AREA

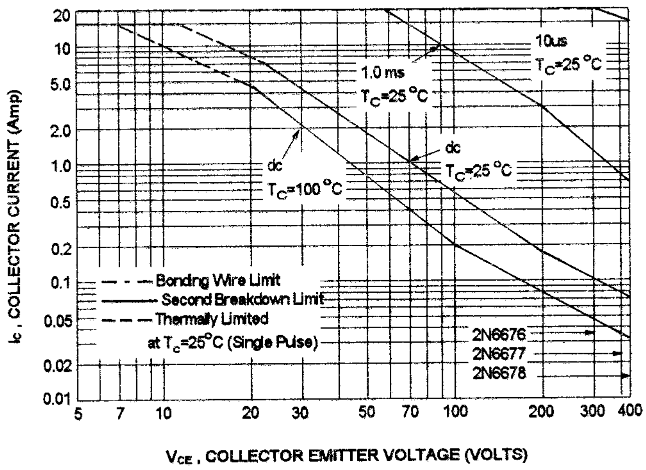
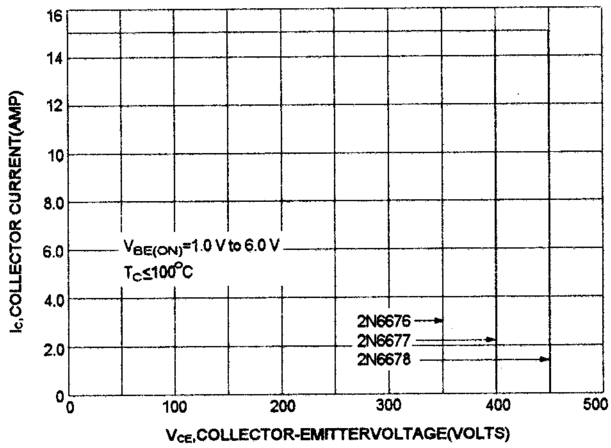


FIG-3 REVERSE BIAS SAFE OPERATING AREA



FORWARD BAIS

There are two limitation 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 curves indicate.

The data of FIG-2 is base on T_C=25 °C;$T_{J(PK)}$ is variable depending on power level. second breakdown pulse limits are valid for duty cycles to 10% provided $T_C \geq 25$°C , At high case temperatures,thermal limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

REVERSE BAIS

For inductive loads, high voltage and high current must be sustained simultaneously during turn-off, in most cases, with the base-to-emitter junction reverse biased Under these conditions the collector voltage must be held to a safe level at or below a specfic value of collector current.This can be accomplished by several mean such as active clamping, RC snubbing, load line shaping, etc. the safe level for these devices is specified as Reverse Bias Safe Operating Area and represents the voltage-current condition allowable during reverse biased turn-off. This rating is verified under clamped conditions so that the device is never subjected to an avalanche mode. FIG-3 gives the RBSOA characteristics.