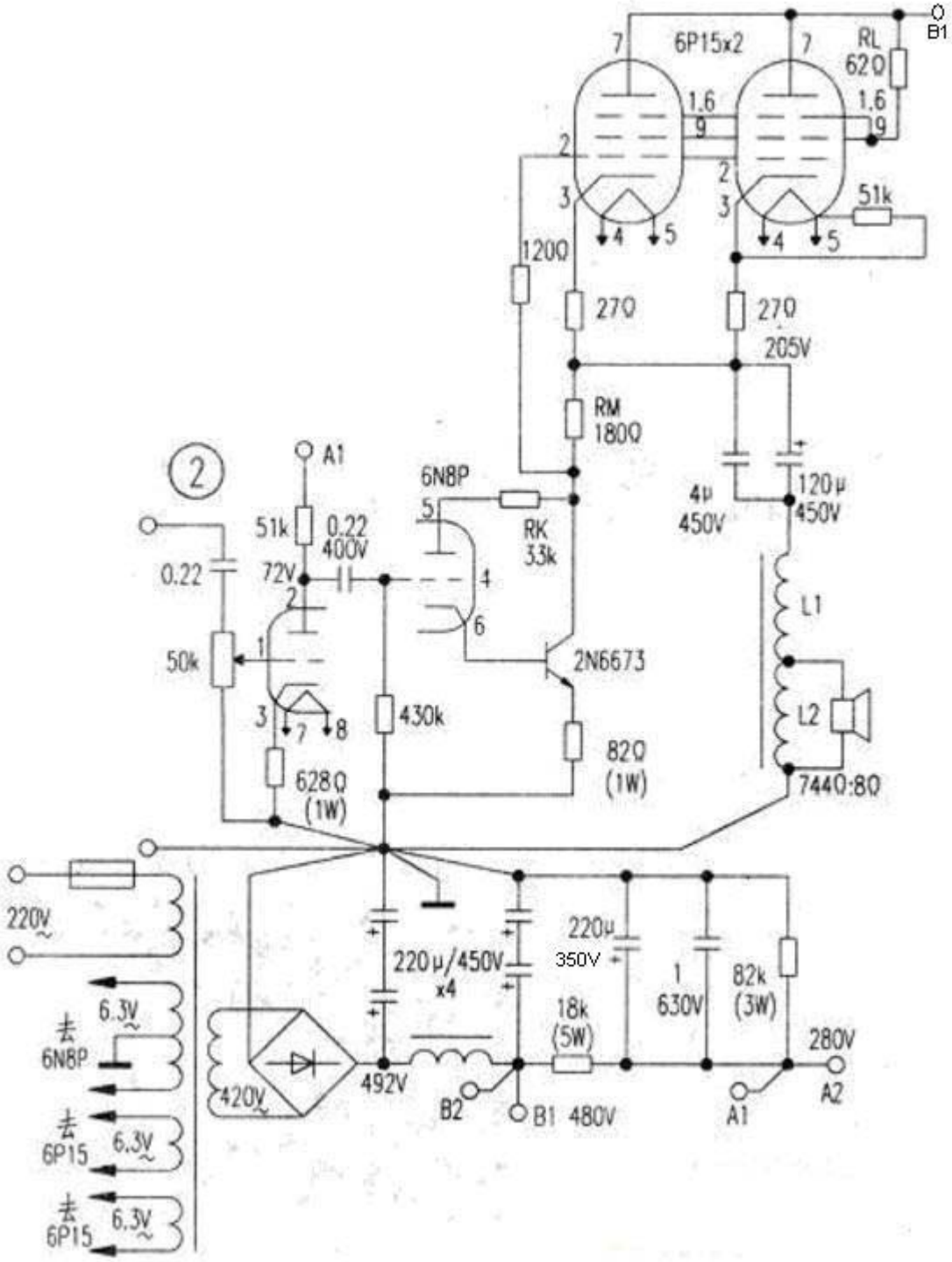
Cathode-Drive, Para-Feed



2N6671, 2N6672, 2N6673

File Number **1090**

5-A SwitchMax Power Transistors

High-Voltage N-P-N Types for Off-Line Power Supplies and Other High-Voltage Switching Applications

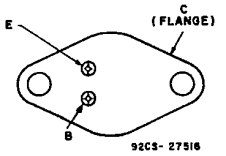
Features:

- *High-temperature parameters guaranteed*
- *Fast switching speed*
- *High voltage ratings:* V_{CEX} *= 350 V to 450 V*
- *Low* V_{CE} *(sat) at* I_C *= 5 A*
- *Steel hermetic TO-204AA package*

Applications:

- *Off-line power supplies*
- *High-voltage inverters*
- *Switching regulators*

TERMINAL DESIGNATIONS



JEDEC TO-204AA

The RCA-2N6671, 2N6672, and 2N6673* SwitchMax series of silicon n-p-n power transistors feature high-voltage capability, fast switching speeds, and low saturation voltages, together with high safe-operating-area (SOA) ratings. They are specially designed for use in off-line power supplies and are also well suited for use in a wide range of inverter or converter circuits and pulse-width-modulated regulators. These high-voltage, high-speed transistors are 100-per-cent tested for parameters that are essential to the design of industrial high-power switching circuits. Switching times, including inductive turn-off time, and saturation voltages are guaranteed at 125°C to provide information necessary for worst-case design.

The RCA-2N6671, 2N6672, and 2N6673 series transistors are supplied in steel JEDEC TO-204AA hermetic packages.

*Formerly RCA8767, RCA8767A, and RCA8767B, respectively.

MAXIMUM RATINGS, *Absolute-Maximum Values:*

	2N6671	2N6672	2N6673	
* V_{CEV} V_{BE} = −1.5 V	450	550	650	V
* V_{CEX} (Clamped) V_{BE} = −1.5 V	350	400	450	V
* V_{CEO}	300	350	400	V
* V_{EBO}	8			V
$I_{C(sat)}$	5			A
* I_C	8			A
I_{CM}	10			A
* I_B	4			A
* P_T				
T_C up to 25°C	150			W
T_C above 25°C, derate linearly	0.86			W/°C
* T_{stg}, T_J	−65 to 200			°C
* T_L At distance ≥ 1/16 in. (1.58 mm) from seating plane for 10 s max.	235			°C

* In accordance with JEDEC registration data.

2N6671, 2N6672, 2N6673

ELECTRICAL CHARACTERISTICS

	CHARACTERISTIC	TEST CONDITIONS: VOLTAGE V dc V_{CE}	V_{BE}	CURRENT A dc I_C	I_B	LIMITS: 2N6671 Min.	2N6671 Max.	2N6672 Min.	2N6672 Max.	2N6673 Min.	2N6673 Max.	UNITS
	$T_C = 25^oC$											
*	I_{CEV}	450	−1.5			–	0.1	–	–	–	–	mA
		550	−1.5			–	–	–	0.1	–	–	
		650	−1.5			–	–	–	–	–	0.1	
*	I_{EBO}		−8	0		–	2	–	2	–	2	
*	$V_{CEO(sus)}$[b]			0.2[a]	0	300	–	350	–	400	–	V
*	h_{FE}	3		5[a]		10	40	10	40	10	40	
*	$V_{BE(sat)}$			5[a]	1	–	1.6	–	1.6	–	1.6	
*	$V_{CE(sat)}$			5[a]	1	–	1	–	1	–	1	
				8[a]	4	–	2	–	2	–	2	
*	V_{CEX}[b] (Clamped $E_{S/b}$)		−5	5	1[e]	350	–	400	–	450	–	V
	L=170 μH, R_{BB}=5 Ω		−5	8	3[e]	200	–	250	–	300	–	
*	$I_{S/b}$	25		6		1	–	1	–	1	–	s
*	$\|h_{fe}\|$ f=5 MHz	10		0.2		3	12	3	12	3	12	
	f_T	10		0.2		15	60	15	60	15	60	MHz
*	C_{obo} f=0.1 MHz	10[c]				50	300	50	300	50	300	pF
*	t_d[d]			5	1	–	0.1	–	0.1	–	0.1	
*	t_r[d]			5	1	–	0.5	–	0.5	–	0.5	
*	t_s[d]			5	1[e]	–	2.5	–	2.5	–	2.5	
*	t_f[d]			5	1[e]	–	0.4	–	0.4	–	0.4	
*	t_c V_{CC}=125 V, L=170 μH, R_C=25 Ω Collector clamped to V_{CEX}			5	1[e]	–	0.4	–	0.4	–	0.4	μs
	$T_C = 125^oC$											
*	I_{CEV}	450	−1.5			–	1	–	–	–	–	mA
		550	−1.5			–	–	–	1	–	–	
		650	−1.5			–	–	–	–	–	1	
*	$V_{CE(sat)}$			5[a]	1	–	2	–	2	–	2	V
*	t_r[d]			5	1	–	0.8	–	0.8	–	0.8	
*	t_s[d]			5	1[e]	–	4	–	4	–	4	
*	t_f[d]			5	1[e]	–	0.8	–	0.8	–	0.8	
*	t_c V_{CC}=125 V, L=170 μH, R_C=25 Ω Collector clamped to V_{CEX}			5	1[e]	–	0.8	–	0.8	–	0.8	μs
*	$R_{\theta JC}$					–	1.17	–	1.17	–	1.17	°C/W

* In accordance with JEDEC registration data.
[a] Pulsed: pulse duration = 300 μs, duty factor ≤ 2%.
[b] CAUTION: The sustaining voltage $V_{CEO(sus)}$ and V_{CEX} MUST NOT be measured on a curve tracer
[c] V_{CB} value.
[d] V_{CC} = 125 V, t_p = 20 μs.
[e] $I_{B_1} = -I_{B_2}$.

2N6671, 2N6672, 2N6673

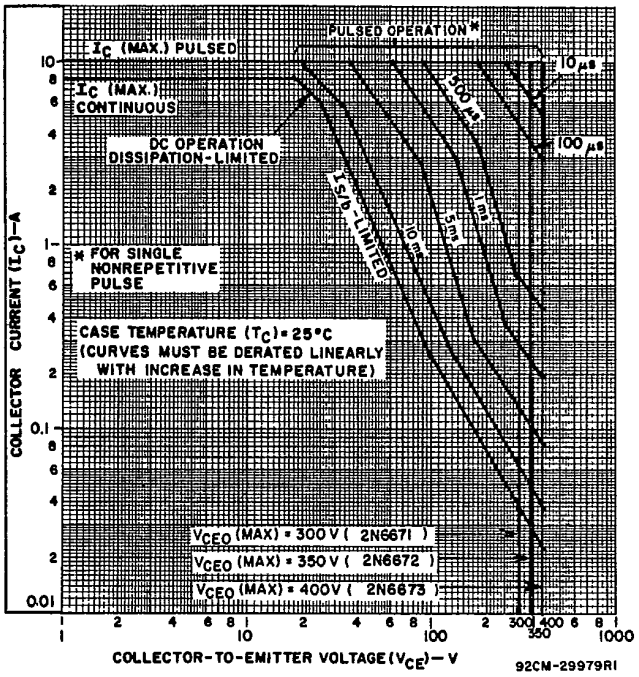


Fig. 1 — Maximum operating areas for all types (T_C = 25° C).

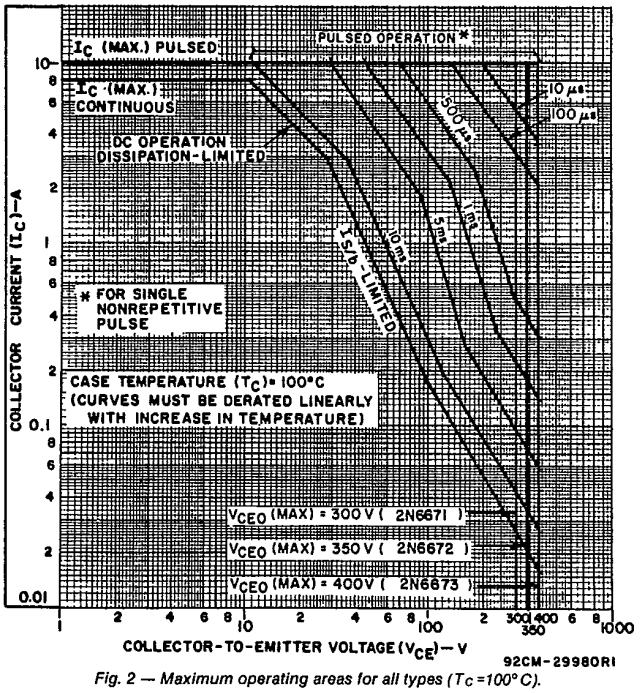


Fig. 2 — Maximum operating areas for all types (T_C =100° C).

2N6671, 2N6672, 2N6673

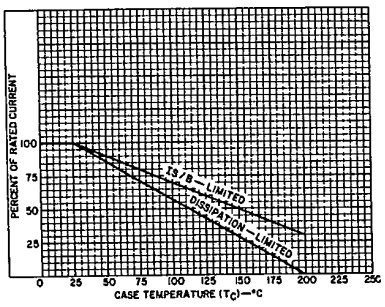


Fig. 3 — Dissipation and $I_{S/B}$ derating curves for all types.

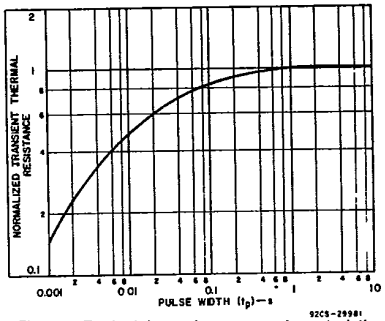


Fig. 4 — Typical thermal-response characteristic for all types.

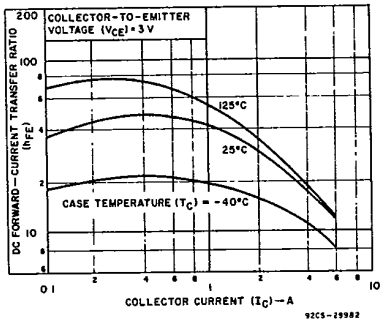


Fig. 5 — Typical dc beta characteristics for all types.

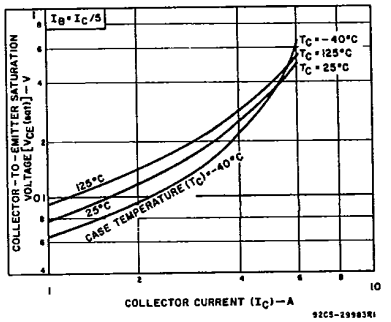


Fig. 6 — Typical collector-to-emitter saturation voltage as a function of collector current for all types.

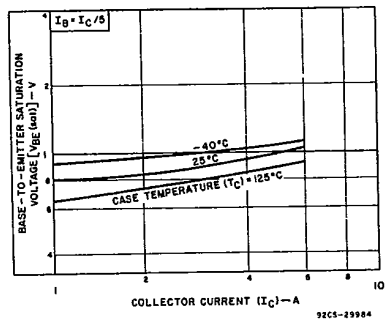


Fig. 7 — Typical base-to-emitter saturation voltage as a function of collector current for all types.

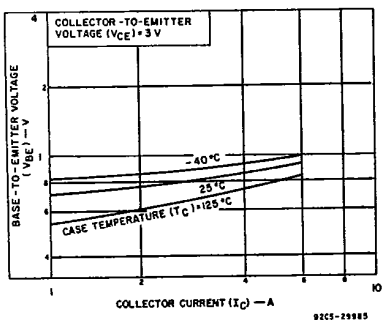


Fig. 8 — Typical base-to-emitter voltage as a function of collector current for all types.

2N6671, 2N6672, 2N6673

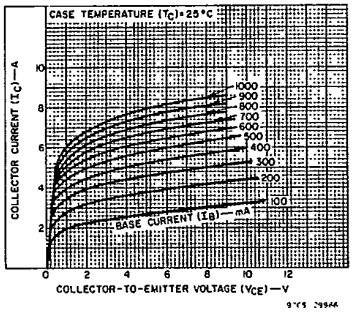


Fig. 9 — Typical output characteristics for all types.

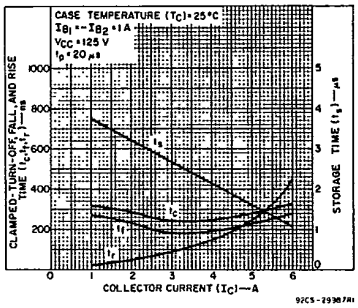


Fig. 10 — Typical saturated switching time characteristics for all types.

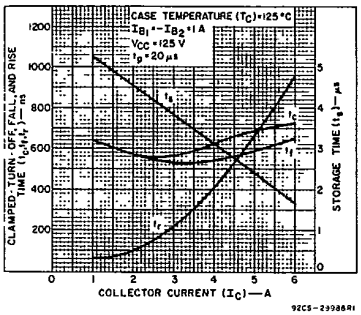


Fig. 11 — Typical saturated switching time characteristics for all types.

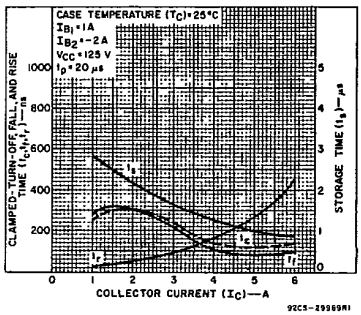


Fig. 12 — Typical saturated switching time characteristics for all types.

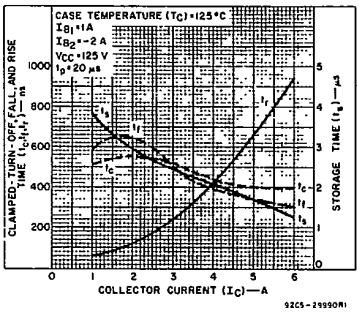


Fig. 13 — Typical saturated switching time characteristics for all types.

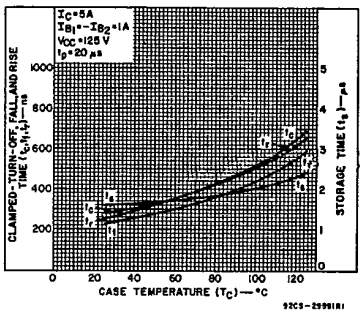


Fig. 14 — Typical saturated switching time characteristics as a function of

2N6671, 2N6672, 2N6673

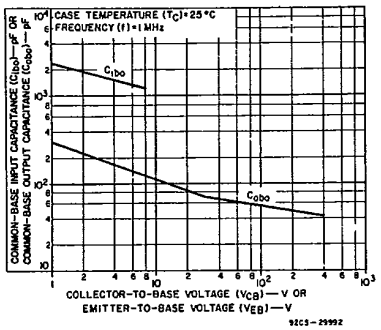


Fig. 15 — Typical common-base input or output capacitance characteristics as a function of collector-to-base voltage or emitter-to-base voltage for all types.

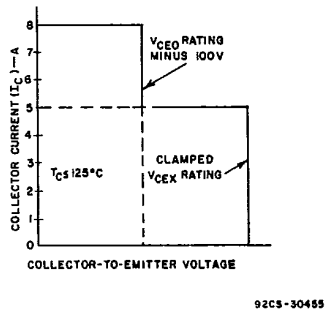


Fig. 16 — Maximum operating conditions for switching between saturation and cutoff.

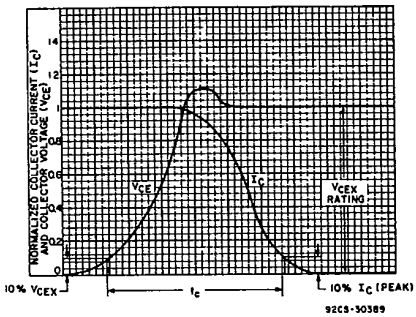


Fig. 17 — Oscilloscope display for measurement of clamped induction switching time (t_c).

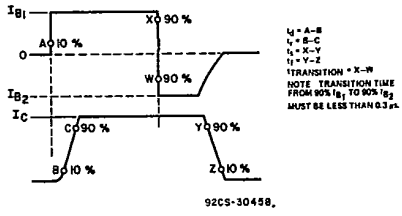


Fig. 18 — Phase relationship between input and output currents showing reference points for specification of switching times.

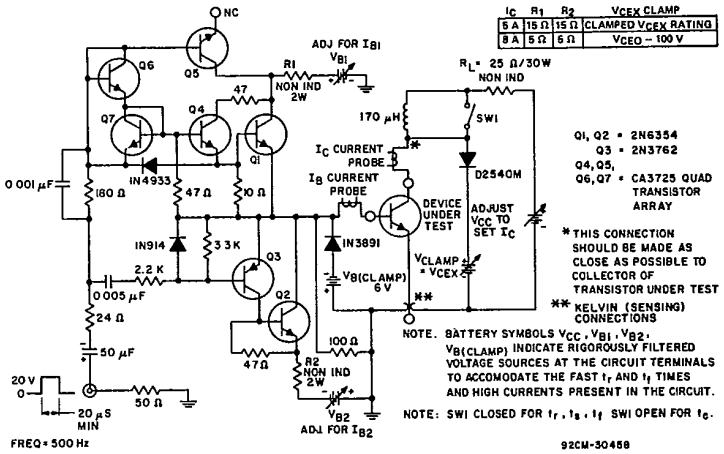
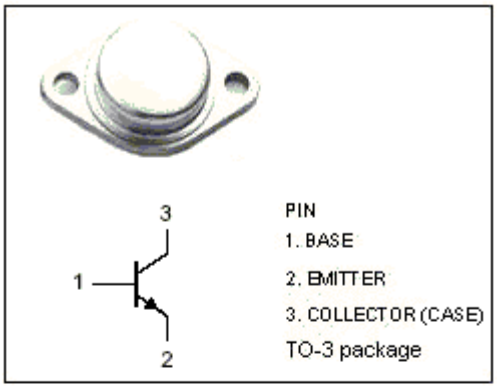


Fig. 19 — Circuit for measuring switching times.

isc Silicon NPN Power Transistors 2N6673

DESCRIPTION

- Collector-Emitter Sustaining Voltage-
  : $V_{CEO(SUS)}$= 450V(Min.)
- Fast Switching Speed
- Low Saturation Voltage

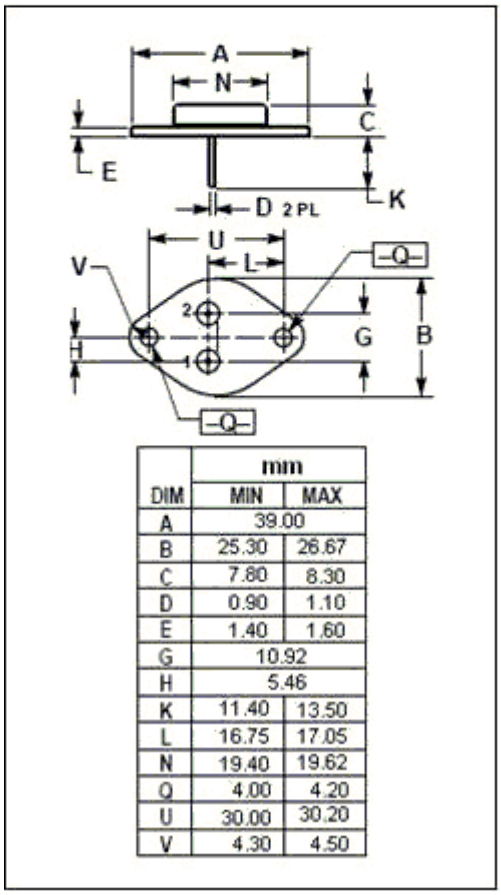


APPLICATIONS

- Off-line power supplies
- High-voltage inverters
- Switching regulators

ABSOLUTE MAXIMUM RATINGS(T_a=25℃)

SYMBOL	PARAMETER	VALUE	UNIT
V_{CEV}	Collector-Emitter Voltage	650	V
V_{CEX}	Collector-Emitter Voltage	450	V
V_{CEO}	Collector-Emitter Voltage	400	V
V_{EBO}	Emitter-Base Voltage	8.0	V
I_C	Collector Current-Continuous	8	A
I_{CM}	Collector Current-Peak	10	A
I_B	Base Current-Continuous	4	A
P_C	Collector Power Dissipation@T_C=25℃	150	W
T_J	Junction Temperature	200	℃
T_{stg}	Storage Temperature	-65~200	℃



DIM	mm MIN	MAX
A	39.00	
B	25.30	26.67
C	7.80	8.30
D	0.90	1.10
E	1.40	1.60
G	10.92	
H	5.46	
K	11.40	13.50
L	16.75	17.05
N	19.40	19.62
Q	4.00	4.20
U	30.00	30.20
V	4.30	4.50

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	MAX	UNIT
$R_{th\ j\text{-}c}$	Thermal Resistance,Junction to Case	1.17	℃/W

isc Silicon NPN Power Transistors 2N6673

ELECTRICAL CHARACTERISTICS

T_C=25℃ unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN	MAX	UNIT
$V_{CEO(SUS)}$	Collector-Emitter Sustaining Voltage	I_C= 200mA; I_B= 0	400		V
$V_{CE(sat)-1}$	Collector-Emitter Saturation Voltage	I_C= 5A; I_B= 1A		1.5	V
$V_{CE(sat)-2}$	Collector-Emitter Saturation Voltage	I_C= 8A; I_B= 4A		2.0	V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	I_C= 5A; I_B= 1A		1.6	V
I_{CEV}	Collector Cutoff Current	V_{CE}= 650V; V_{BE}=-1.5V V_{CE}= 650V; V_{BE}=-1.5V; T_C= 125℃		0.1 1.0	mA
I_{EBO}	Emitter Cutoff Current	V_{EB}= 8.0V; I_C= 0		2.0	mA
h_{FE}	DC Current Gain	I_C= 5A ; V_{CE}= 3V	10	40	
f_T	Current Gain-Bandwidth Product	I_C= 0.2A ; V_{CE}= 10V	15	60	MHz
C_{OB}	Output Capacitance	I_E= 0; V_{CB}= 10V; f_{test}=0.1MHz	50	300	pF

Switching times

t_d	Delay Time	I_C= 5A; V_{CC}= 125V; I_{B1}= -I_{B2}= 1A; t_p=20 μ s		0.1	μ s
t_r	Rise Time			0.5	μ s
t_s	Storage Time			2.5	μ s
t_f	Fall Time			0.4	μ s