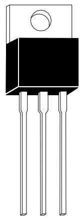
HMJE13007

NPN EPITAXIAL PLANAR TRANSISTOR



TO-220

Description

- High Voltage, High Speed Power Switch
- Switch Regulators
- PWM Inverters and Motor Controls
- Solenoid and Relay Drivers
- Deflection Circuits

Absolute Maximum Ratings (T_A=25°C)

- Maximum Temperatures
  Storage Temperature .... -50 ~ +150 °C
  Junction Temperature .... 150 °C Maximum

- Maximum Power Dissipation
  Total Power Dissipation (T_C=25°C) .... 80 W

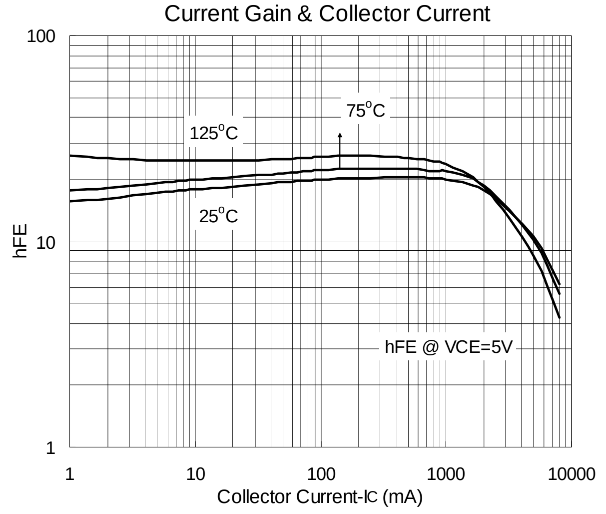
- Maximum Voltages and Currents (T_A=25°C)
  V_{CBO} Collector to Base Voltage .... 700 V
  V_{CEO} Collector to Emitter Voltage .... 400 V
  V_{EBO} Emitter to Base Voltage .... 9 V
  I_C Collector Current (Continuous) .... 8 A
  I_B Base Current (Continuous) .... 4 A

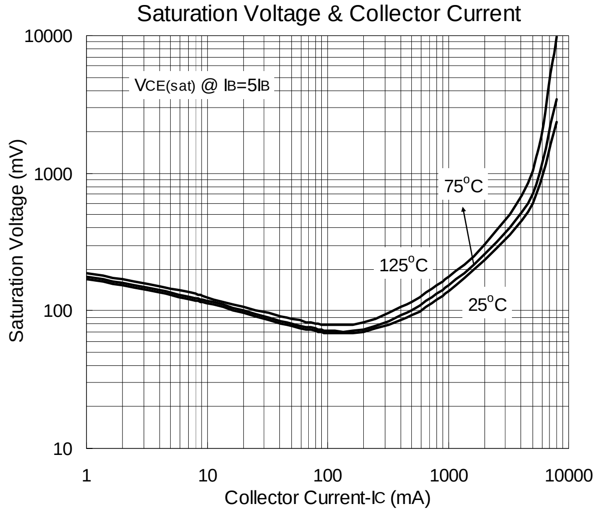
Electrical Characteristics (T_A=25°C)

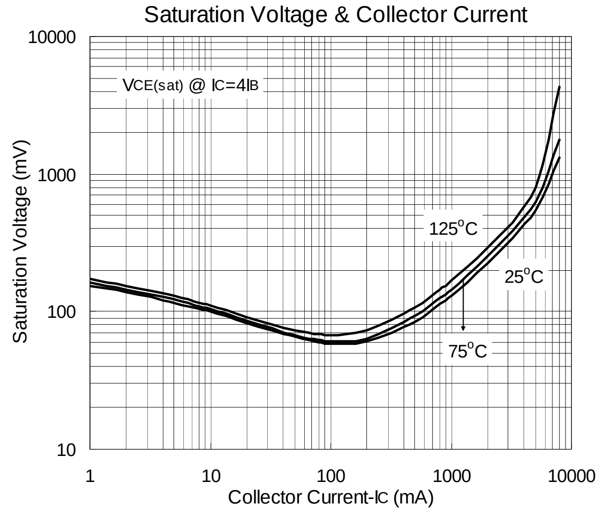
Characteristic	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Breakdown Collector-Base Voltage	BV_{CBO}	700	-	-	V	I_C=1mA
Breakdown Collector-Emitter Voltage	BV_{CEO}	400	-	-	V	I_C=10mA
Emitter Cut-off Current	I_{EBO}	-	-	100	uA	V_{EB}=9V
Collector Cut-off Current	I_{CEX}	-	-	100	uA	V_{CE}=700V, $V_{BE(off)}$=1.5V
Collector-Emitter Saturation Voltage	*$V_{CE(sat)1}$	-	-	1	V	I_C=2A, I_B=0.4A
	*$V_{CE(sat)2}$	-	-	2	V	I_C=5A, I_B=1A
	*$V_{CE(sat)3}$	-	-	3	V	I_C=8A, I_B=2A
Base-Emitter Saturation Voltage	*$V_{BE(sat)}$	-	-	1.2	V	I_C=2A, I_B=0.4A
	*$V_{BE(sat)}$	-	-	1.6	V	I_C=5A, I_B=1A
DC Current Gain	*h_{FE1}		-	48		I_C=0.5A, V_{CE}=5V
	*h_{FE2}	30	-	45		I_C=1.0A, V_{CE}=5V
	*h_{FE3}	25	-	40		I_C=2A, V_{CE}=5V
	*h_{FE4}	5	-	-		I_C=8A, V_{CE}=5V
Rising Time	tr			1	us	VCC=5V, IC=0.5A, (UI9600)
Storage Time	tstg	3		6	us	
Fall Time	tf			0.5	us	
Output Capacitance	Cob		75		pF	VCB=10V, f=1MHz
Current Gain Bandwidth Product	fT	5			MHz	VCE=10V, IC=0.5A, f=1MHz

*Pulse Test: Pulse Width ≤380us, Duty Cycle≤2%

Characteristics Curve


Current Gain & Collector Current


Saturation Voltage & Collector Current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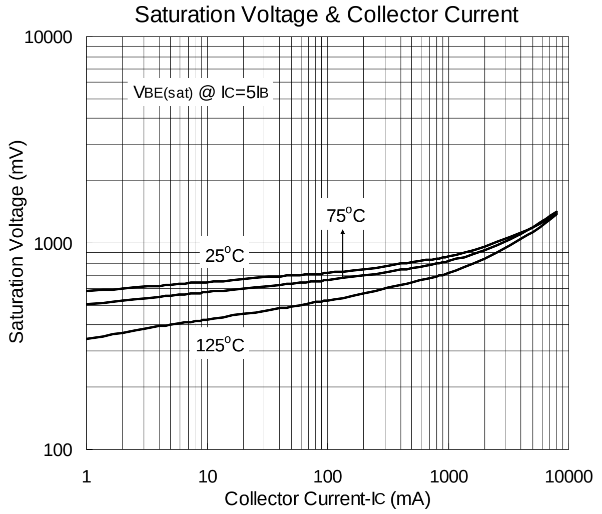
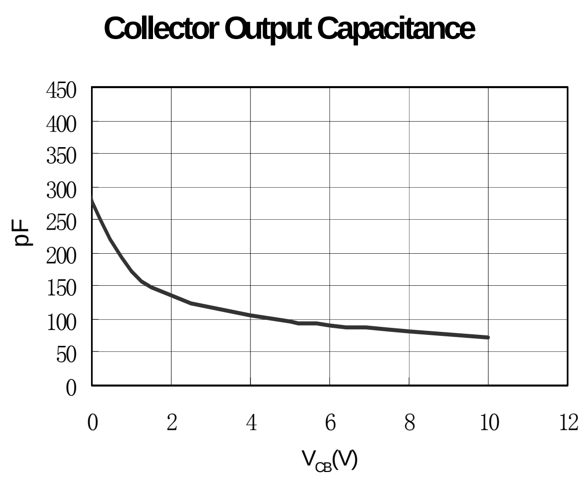
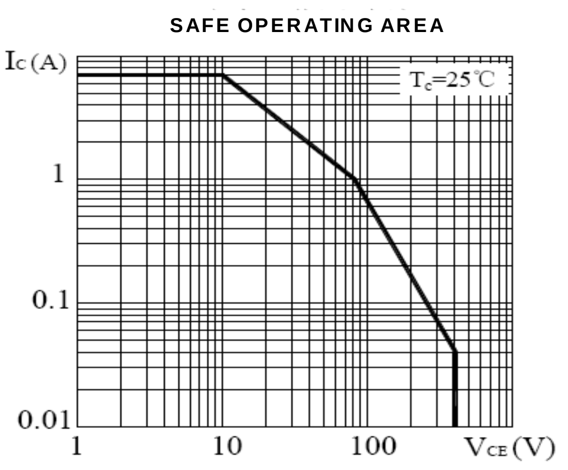
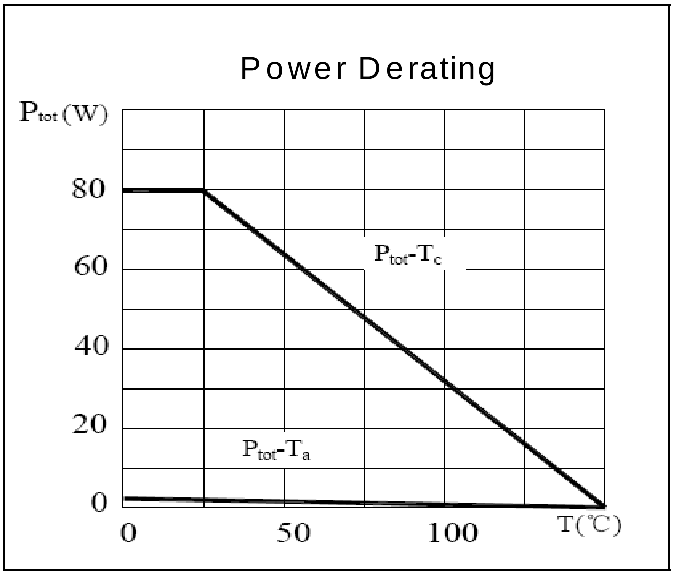
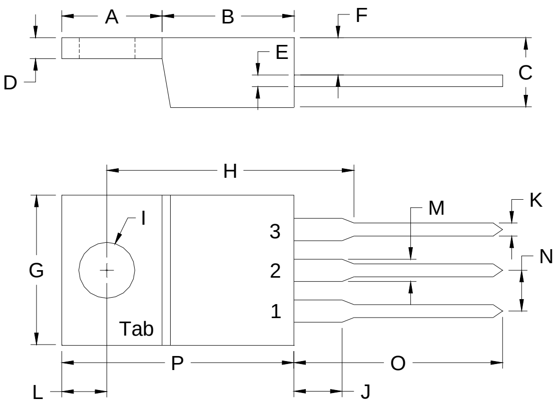

Saturation Voltage & Collector Current


Collector Output Capacitance


SAFE OPERATING AREA

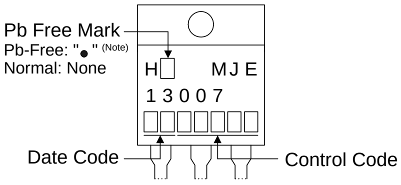

Power Derating
Ptot (W)
80
60
40
20
0
Ptot-Tc
Ptot-Ta
0
50
100
T(℃)

TO-220AB Dimension



3-Lead TO-220AB
Plastic Package
HSMC Package Code: E

Marking:



Note: Green label is used for pb-free packing

Pin Style: 1.Base 2.Collector 3.Emitter

Material:
- Lead solder plating: Sn60/Pb40 (Normal), Sn/3.0Ag/0.5Cu or Pure-Tin (Pb-free)
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

DIM	Min.	Max.
A	5.58	7.49
B	8.38	8.90
C	4.40	4.70
D	1.15	1.39
E	0.35	0.60
F	2.03	2.92
G	9.66	10.28
H	-	*16.25
I	-	*3.83
J	3.00	4.00
K	0.75	0.95
L	2.54	3.42
M	1.14	1.40
N	-	*2.54
O	12.70	14.27
P	14.48	15.87

*: Typical, Unit: mm

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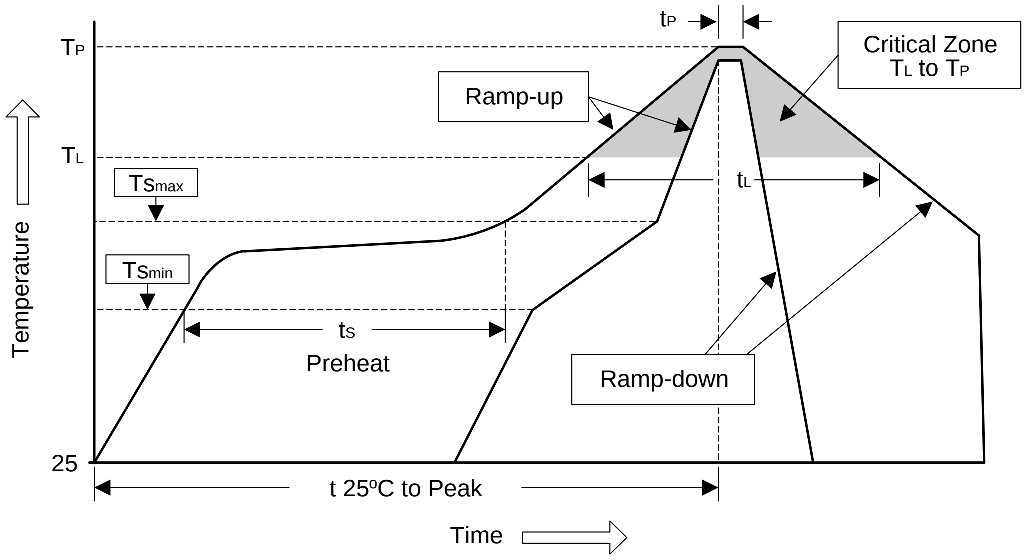
Soldering Methods for HSMC's Products

1. Storage environment: Temperature=10°C~35°C Humidity=65%±15%

2. Reflow soldering of surface-mount devices

Figure 1: Temperature profile



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	<3°C/sec	<3°C/sec
Preheat		
- Temperature Min (Ts_{min})	100°C	150°C
- Temperature Max (Ts_{max})	150°C	200°C
- Time (min to max) (ts)	60~120 sec	60~180 sec
Tsmax to T_L		
- Ramp-up Rate	<3°C/sec	<3°C/sec
Time maintained above:		
- Temperature (T_L)	183°C	217°C
- Time (t_L)	60~150 sec	60~150 sec
Peak Temperature (T_P)	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature (t_P)	10~30 sec	20~40 sec
Ramp-down Rate	<6°C/sec	<6°C/sec
Time 25°C to Peak Temperature	<6 minutes	<8 minutes

3. Flow (wave) soldering (solder dipping)

Products	Peak temperature	Dipping time
Pb devices.	245°C ±5°C	10sec ±1sec
Pb-Free devices.	260°C ±5°C	10sec ±1sec