

NPN High-Voltage Transistor multicomp^{PRO}

RoHS
Compliant



Features

- This product is available in AEC-Q101 Compliant and PPAP Capable also.

Absolute Maximum Ratings (Ta = 25°C Unless otherwise specified)

Parameter	Symbol	Value			Unit
		MIN	TYP	MAX	
Collector–Base voltage (Open Emitter)	V _{CB0}	--	--	180	V
Collector–Emitter voltage (Open Base)	V _{CE0}			160	
Collector current	I _C			600	mA
Total power dissipation up to Tamb = 25°C	P _{tot}			250	m/W
Junction temperature	T _J			150	°C
Collector–emitter saturation voltage	V _{CEsat}			0.2	V
Emitter–base voltage (open collector)	V _{EBO}			6	

Thermal Resistance

Parameter	Symbol	Value	Unit
From junction to ambient	R _{th (j-a)}	500	K/W

Electrical Characteristics at (Ta = 25°C Unless otherwise specified)

Parameter	Symbol	Test Condition	Value			Unit
			Min.	Typ.	Max.	
Collector Cutoff Current	I _{CBO}	I _E = 0; V _{CB} = 120 V	--		50	nA
		I _E = 0; V _{CB} = 120 V; T _{amb} = 100 °C				μA
Emitter Cutoff Current	I _{EBO}	I _C = 0; V _{EB} = 4 V				nA
Breakdown voltages	V _{(BR)CEO}	I _C = 1 mA; I _B = 0	160		--	V
	V _{(BR)CBO}	I _C = 100 μA; I _E = 0	180			
	V _{(BR)EBO}	I _C = 100 μA; I _E = 0	6			

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Parameter	Symbol	Test Condition	Value			Unit
			Min.	Typ.	Max.	
Saturation voltages	V_{CEsat}	$I_C = 10\text{ mA}; I_B = 1\text{ mA}$	--		0.15	
	V_{BEsat}				1	
	V_{CEsat}	$I_C = 50\text{ mA}; I_B = 5\text{ mA}$			0.2	
	V_{BEsat}				1	
DC Current Gain	h_{FE}	$I_C = 1\text{ mA}; V_{CE} = 5\text{ V}$	80		--	
		$I_C = 10\text{ mA}; V_{CE} = 5\text{ V}$			250	
		$I_C = 50\text{ mA}; V_{CE} = 5\text{ V}$	30		--	
Small-signal current gain	h_{fe}	$I_C = 1\text{ mA}; V_{CE} = 10\text{ V};$ $f = 1\text{ kHz}$	50		200	
Output capacitance at $f = 1\text{ MHz}$	C_o	$I_E = 0; V_{CB} = 10\text{ V}$	--		6	pF
Input capacitance at $f = 1\text{ MHz}$	C_i	$I_C = 0; V_{EB} = 0.5\text{ V}$			30	
Transition frequency at $f = 100\text{ MHz}$	f_T	$I_C = 10\text{ mA}; V_{CE} = 10\text{ V}$	100		300	MHz

Typical Elecitrical Characteristic Curves

Figure 1. DC Current Gain

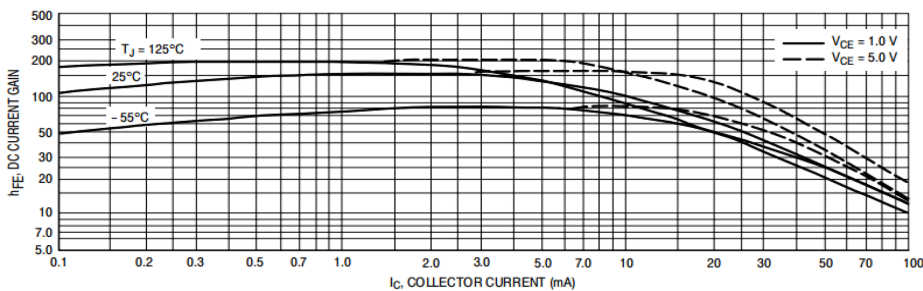
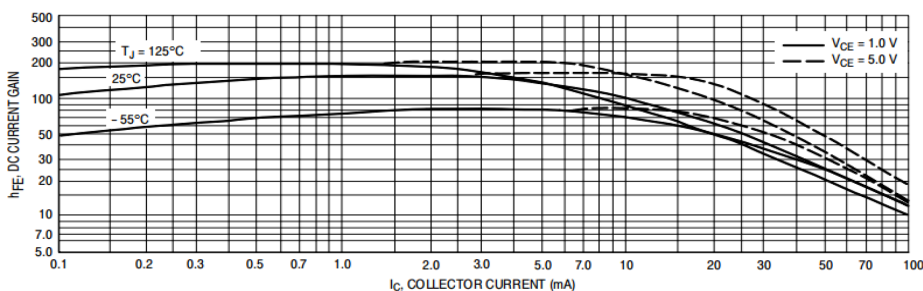


Figure 1. DC Current Gain



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Typical Electrical Characteristic Curves

Figure 3. Collector Cut-Off Region

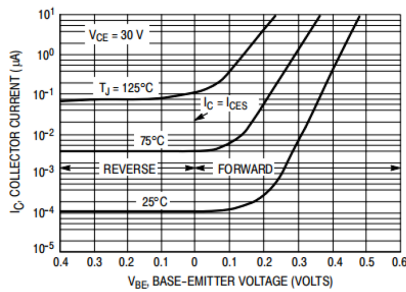


Figure 4. $V_{CE(sat)}$

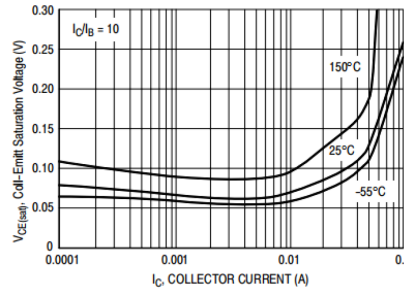


Figure 5. $V_{BE(sat)}$

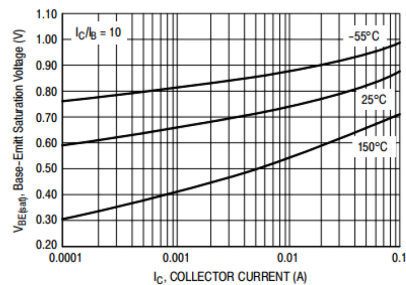


Figure 7. Temperature Coefficients

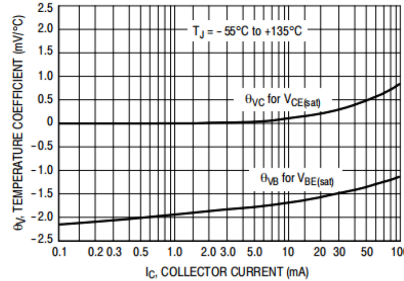


Figure 6. $V_{BE(on)}$

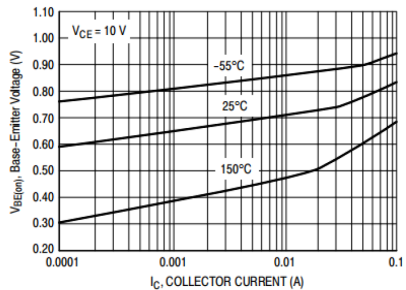


Figure 8. Capacitances

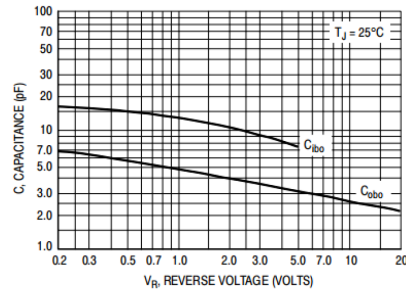
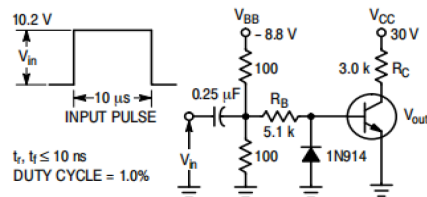


Figure 9. Switching Time Test Circuit



Values Shown are for I_C @ 10 mA

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Typical Electrical Characteristic Curves

Figure 10. Current Gain Bandwidth Product

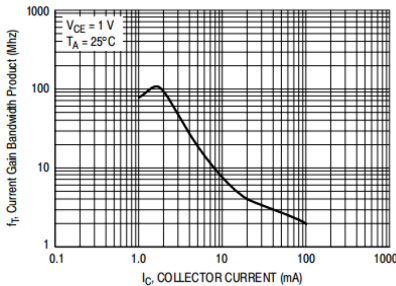


Figure 12. Capacitances

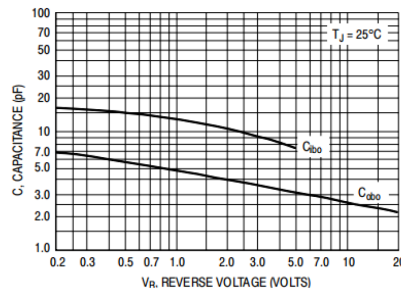


Figure 11. Safe Operating Area

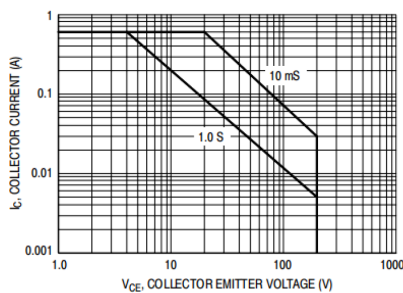
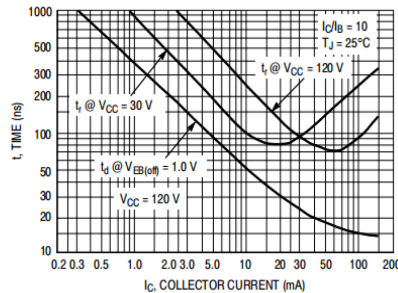


Figure 13. Turn-On Time



Recommended Reflow Solder Profiles

The recommended reflow solder profiles for Pb and Pb-free devices are shown below.

Figure 1 shows the recommended solder profile for devices that have Pb-free terminal plating, and where a Pb-free solder is used.

Figure 2 shows the recommended solder profile for devices with Pb-free terminal plating used with leaded solder, or for devices with leaded terminal plating used with a leaded solder.

Figure 1

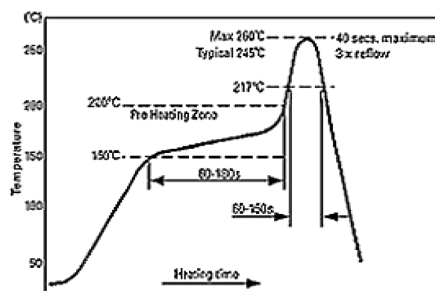
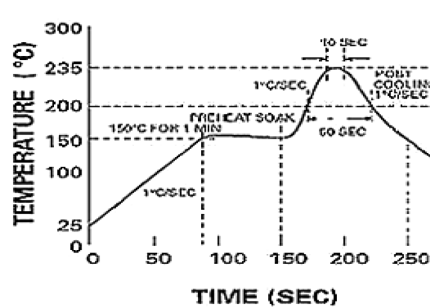


Figure 2



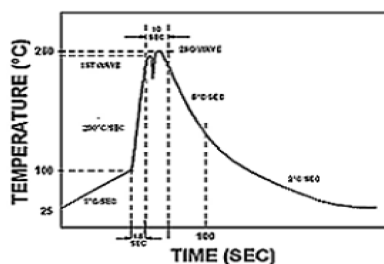
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Reflow profiles in tabular form

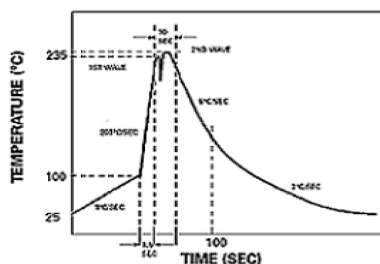
Profile Feature	Sn-Pb System	Pb-Free System
Average Ramp-Up Rate	~3°C/second	~3°C/second
Preheat – Temperature Range – Time	150-170°C 60-180 seconds	150-200°C 60-180 seconds
Time maintained above: – Temperature – Time	200°C 30-50 seconds	217°C 60-150 seconds
Peak Temperature	235°C	260°C max.
Time within +0 -5°C of actual Peak	10 seconds	40 seconds
Ramp-Down Rate	3°C/second max.	6°C/second max.

Recommended Wave Solder Profiles

The Recommended solder Profile For Devices with Pb-free terminal plating where a Pb-free solder is used



The Recommended solder Profile For Devices with Pb-free terminal plating used with leaded solder, or for devices with leaded terminal plating used with leaded solder



Wave Profiles in Tabular Form

Profile Feature	Sn-Pb System	Pb-Free System
Average Ramp-Up Rate	~200°C/second	~200°C/second
Heating rate during preheat	Typical 1-2, Max 4°C/sec	Typical 1-2, Max 4°C/Sec
Final preheat Temperature	Within 125°C of Solder Temp	Within 125°C of Solder Temp
Peak Temperature	235°C	260°C max.
Time within +0 -5°C of actual Peak	10 seconds	10 seconds
Ramp-Down Rate	5°C/second max.	5°C/second max.

Part Number Table

Description	Part Number
High-Voltage Transistor, NPN, 600mA	CMBT5551

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