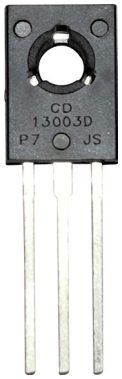
Silicon Power Transistor

multicomp PRO

RoHS Compliant



Applications

- Suitable for Lighting, Switching Regulator and Motor Control

Features

- With Built - in Integrated Diode between Emitter & Collector
- 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
Collector Base Voltage		V_{CBO}	700	V
Collector Emitter (sus) Voltage		V_{CEO}	400	
Emitter Base Voltage		V_{EBO}	9	
Collector Current	Continuous	I_C	2	A
	Pulse[1]	I_{CM}	3	
Collector Current	Continuous	I_B	0.75	
	Pulse[1]	I_{BM}	1.5	
Emitter Current	Continuous	I_E	2.25	
	Pulse[1]	I_{EM}	4.5	
Power Dissipation @ T_a=25 ºC		P_D	1.4	W
Derate Above 25ºC			11.2	mW/°C
Power Dissipation @ T_c=25 ºC		P_D	45	W
Derate Above 25ºC			360	mW/°C
Operating And Storage Junction Temperature Range		T_J, T_{STG}	-65 to +150	°C

Thermal Resistance

Parameter	Symbol	Value	Unit
Junction to Case	$R_{th\ (j-c)}$	2.77	°C/W
Junction to Ambient	$R_{th\ (j-a)}$	89	
Maximum Lead Temperature for Soldering Purpose: 1/8” from Case for 5 Seconds	T_L	275	°C

Note:
1. Pulse Test: Pulse Width=5ms, Duty Cycle=10%

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

Parameter	Symbol	Test Condition	Value			Unit
			Min.	Typ.	Max.	
Collector Base Voltage	V_{CBO}	I_C=1mA, I_E=0	700	--	--	V
Collector Emitter (sus) Voltage	$V_{CEO(SUS)}$[1]	I_C=10mA, I_B=0	400			
Collector Cut Off Current	I_{CBO}	V_{CB}=680V, I_E=0	--		1	mA
		V_{CB}=680V, I_E=0, T_C=100ºC			5	
Emitter Cutoff Current	I_{EBO}	V_{EB}=9V, I_C=0			1	
DC Current Gain	h_{FE}[2]	I_C=500mA, V_{CE}=5V[2]	15		25	
	h_{FE}	I_C=1A,V_{CE}=5V	5		25	
Collector Emitter Saturation Voltage	$V_{CE(sat)}$[1]	I_C=0.5A, I_B=0.1A	--		0.5	V
		I_C=1A, I_B=0.25A			1	
		I_C=1.5A, I_B=0.5A			2.5	
		I_C=1A, I_B=0.25A,T_C=100ºC			1	
Base Emitter Saturation Voltage	$V_{BE(sat)}$[1]	I_C=0.5A, I_B=0.1A			1	
		I_C=1A, I_B=0.25A			1.2	
		I_C=1A, I_B=0.25A,T_C=100ºC			1.1	
Integrated Diode Forward Voltage	V_{FEC}	I_F=2A			2	

Dynamic Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			Min.	Typ.	Max.	
Current Gain Bandwidth Product	f_T	I_C=100mA, V_{CE}=10V, f=1MHz	4	--	--	MHz
Output Capacitance	C_{OB}	V_{CB}=10V, f=0.1MHz	--	21		pF

Switching Time

Parameter	Symbol	Test Condition	Value			Unit
			Min.	Typ.	Max.	
Turn On Time	t_{on}	V_{CC}=125V, I_C=1A, I_{B1}=0.2A, I_{B2}=0.2A	--	--	1.1	µS
Storage Time	t_{stg}		2		4	
Fall Time	t_f		--		0.7	

Note:
1. Pulse Test:- PW=300µs, Duty Cycle=2%

hFE^2 Classification:-	A	B
	15-19	19-25

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

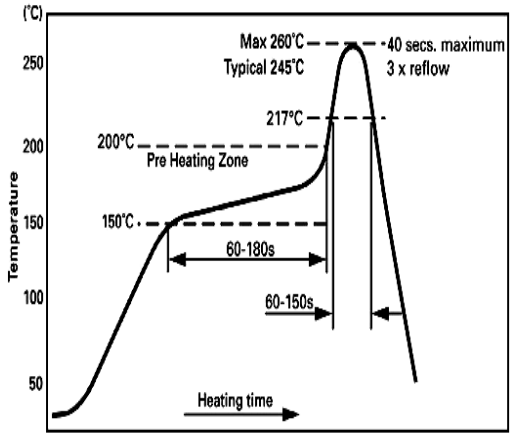
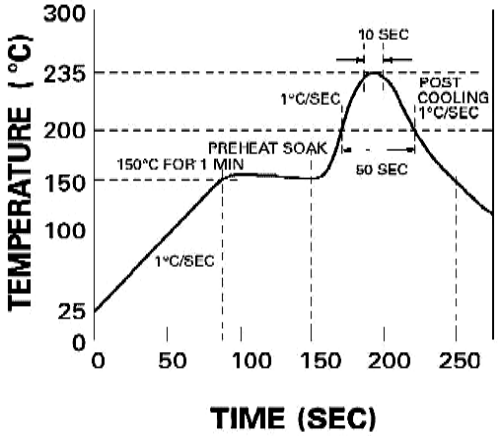


Figure 2

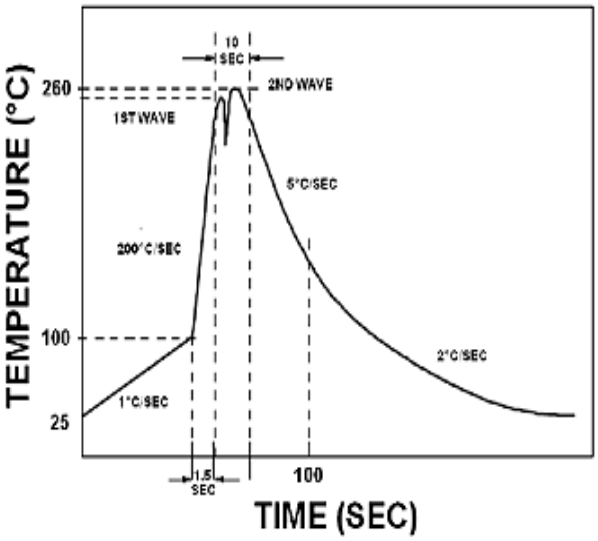


Reflow profiles in tabular form

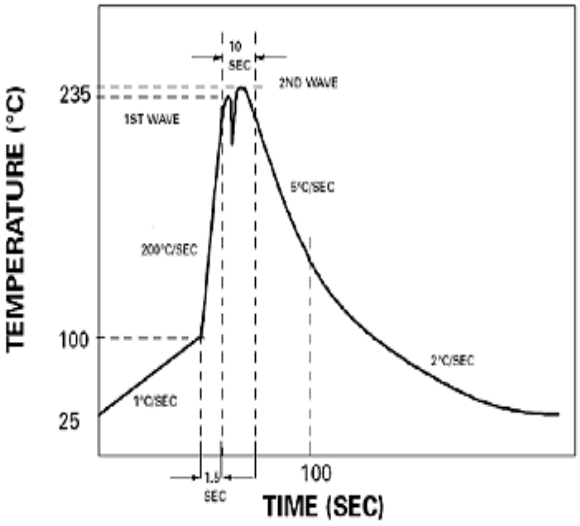
Profile Feature	Sn-Pb System	Pb-Free System
Average Ramp-Up Rate	~3°C/second	~3°C/second
Preheat – Temperature Range – Time	150-170°C 60-180 seconds	150-200°C 60-180 seconds
Time maintained above: – Temperature – Time	200°C 30-50 seconds	217°C 60-150 seconds
Peak Temperature	235°C	260°C max.
Time within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

Typical Characteristic Curves

Fig 1: Collector current v/s Collector Emitter Voltage

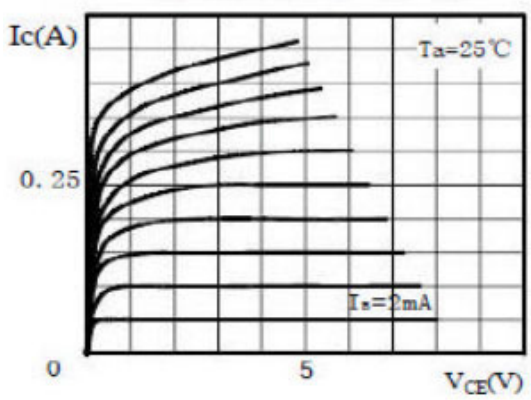


Fig 2:DC gain v/s Collector Current

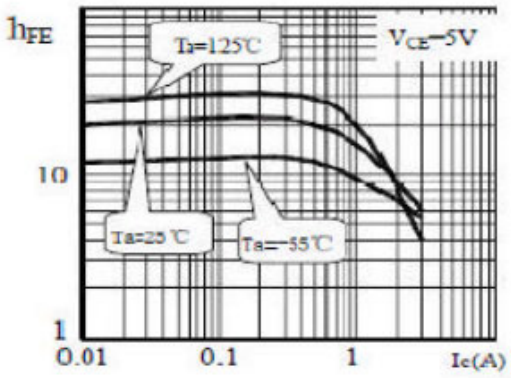


Fig 3:Collector emitter saturation voltage v/s Collector current

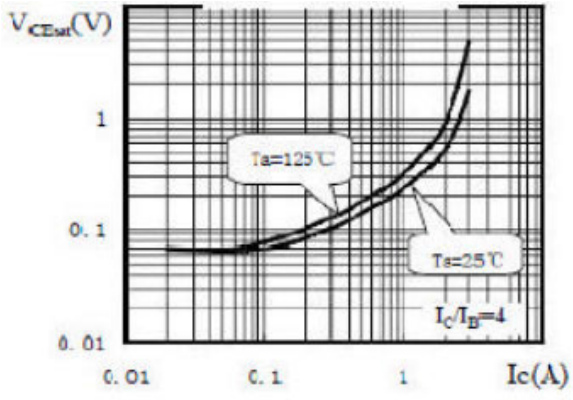


Fig 4. Base Emitter saturation voltage v/s collector current

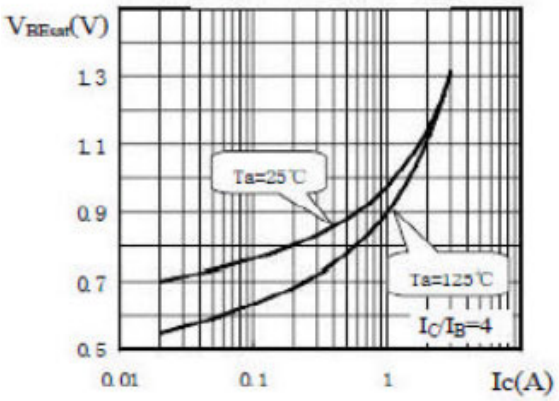


Fig 5: Power(%) v/s temperature

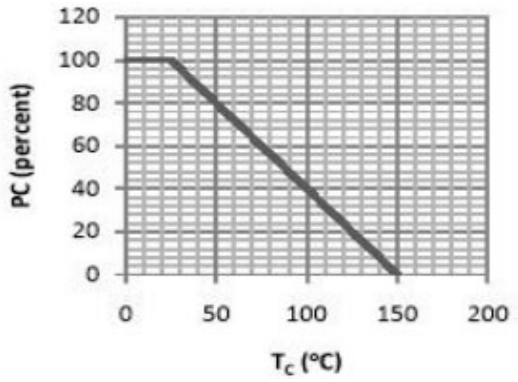
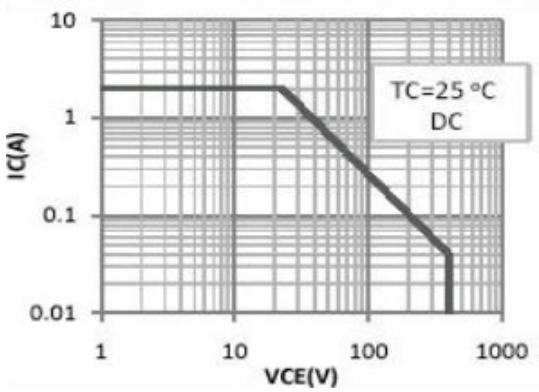
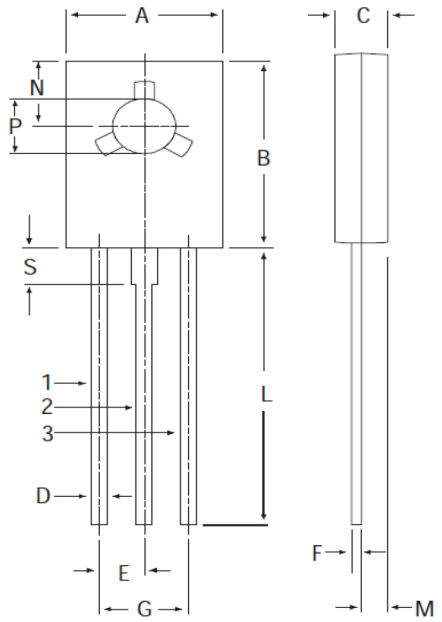


Fig 6: Safe operating Area



Dimensions

TO-126 Leaded Plastic Package



DIM	MIN.	MAX.
A	7.4	7.8
B	10.5	10.8
C	2.4	2.7
D	0.7	0.9
E	2.25 TYP	
F	0.49	0.75
G	4.5 TYP	
L	15.7 TYP	
M	1.27 TYP	
N	3.75 TYP	
P	3	3.2
S	2.5 TYP	

Dimensions : Millimetres

Part Number Table

Description	Part Number
Silicon Power Transistor, NPN, TO-126	CD13003D