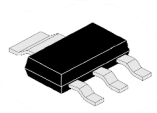
200V PNP Medium Power Transistor

CZT956



SOT-223

SOT-223
Surface Mount
Plastic Package
RoHS compliant

FEATURE:

1. BV_{CEO} > -200V
2. I_C = -2A High Continuous Collector Current
3. I_C = -5A Peak Pulse Current
4. Low Saturation Voltage $V_{CE\ (sat)}$ < -165mV @ -1A
5. H_{FE} Specified up to -5A for a High Gain Hold-Up
6. This product is available in AEC-Q101 Compliant and PPAP Capable also.

Note: For AEC-Q101 compliant products, please use suffix -AQ in the part number while ordering.

ABSOLUTE MAXIMUM RATINGS (Ta = 25 ℃ Unless otherwise specified)

PARAMETER	SYMBOL	VALUE	UNIT
Collector Emitter Voltage	V_{CEO}	200	V
Collector Base Voltage	V_{CBO}	220	V
Emitter Base Voltage	V_{EBO}	7	V
Peak Pulse Current	I_{CM}	5	A
Continuous Collector Current	I_C	2	A

Thermal Characteristics (T_A = 25°C, unless otherwise specified)

PARAMETER	SYMBOL	VALUE	UNIT
Power Dissipation [1]	P_D	3	W
		24	
Linear Derating Factor [2]		2	mW/°C
		13	
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	42 [1]	°C/W
		78 [2]	
Thermal Resistance Junction to Lead	$R_{\theta JL}$	8.8 [3]	°C/W
Operating and Storage Temperature Range	T_j, T_{stg}	- 55 to +150	°C

ESD Ratings [4]

PARAMETER	SYMBOL	VALUE	UNIT	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400		C

ELECTRICAL CHARACTERISTICS at (T_a = 25 ℃ Unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Collector-base breakdown voltage	$V_{(BR)CBO}$	I_C = -100μA, I_E = 0	220	300	--	V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	I_C = -1mA, I_B = 0 [5]	200	240	--	
Collector-emitter breakdown voltage	$V_{(BR)CER}$	I_C = -1μA, RB ≤ 1kΩ [5]	220	300	--	
Emitter-base breakdown voltage	$V_{(BR)EBO}$	I_E=-100μA,I_C=0	7	8	--	
Collector cut-off current	I_{CBO}	V_{CB} = -200V,	--	--	50	nA
		V_{CB} = -200V, T_a = 100° C	--	--	1	μA
Collector Cut-Off Current	I_{CER} R≤1kΩ	V_{CB} = -200V,	--	--	50	nA
		V_{CB} = -200V, T_a = 100° C	--	--	1	μA
Emitter cut-off current	I_{EBO}	V_{EB} = -6V	--	--	10	nA
Static forward current transfer ratio [5]	h_{FE} [1]	V_{CE} = -5V, I_C = -10mA	100	200	--	
	h_{FE} [2]	V_{CE} = -5V, I_C = -1A	100	200	300	
	h_{FE} [3]	V_{CE}= -5V, I_C = -2A	50	150	--	
	h_{FE} [4]	V_{CE} = -5V, I_C = -5A	--	10	--	
Collector-emitter saturation voltage [5]	$V_{CE(sat)}$	I_C = -100mA,I_B = -10mA	--	30	50	mV
		I_C = -1A,I_B = -100mA	--	120	165	mV
		I_C = -2A,I_B = -400mA	--	168	275	mV
Base-emitter saturation voltage [5]	$V_{BE(sat)}$	I_C = -2A,I_B = -400mA	--	970	1110	mV
Base-Emitter Turn-On Voltage [5]	$V_{BE(on)}$	I_C = -2A, V_{CE} = -5V	--	810	950	mV
Transition frequency [5]	f_T	V_{CE}=-10V, I_C=-100mA,	--	110	--	MHz
Output capacitance	C_{obo}	V_{CB} = -20V, f = 1MHz	--	32	--	pF
Switching Times	t_{on}	I_C =-1A, V_{CC} = -50V, I_{B1} = -I_{B2} = -100mA	--	67	--	nS
	t_{off}		--	1140	--	nS

Notes:

1. For a device mounted with the collector lead on 52mm x 52mm 2oz copper that is on a single sided 1.6mm FR4 PCB;
2. Same as Note 6, except mounted on 25mm x 25mm 1oz copper.
3. Thermal resistance from junction to solder-point (at the end of the collector lead).
4. Refer to JEDEC specification JESD22-A114 and JESD22-A115.
5. Measured under pulsed conditions. Pulse Width=300μs. Duty cycle ≤2%
6. For PNP device voltage and current values will be negative (-).

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

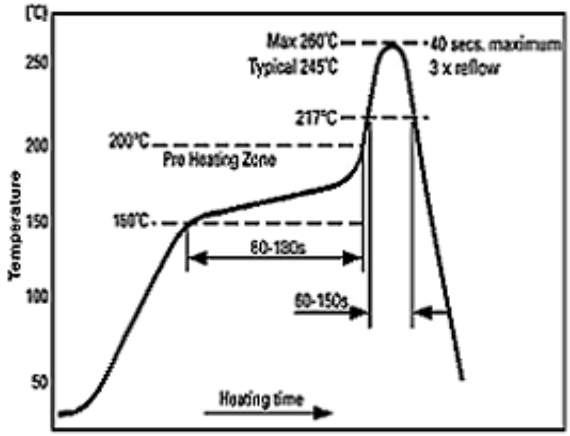
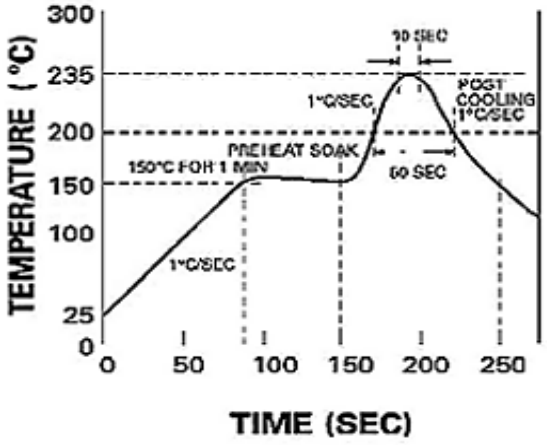


Figure 2

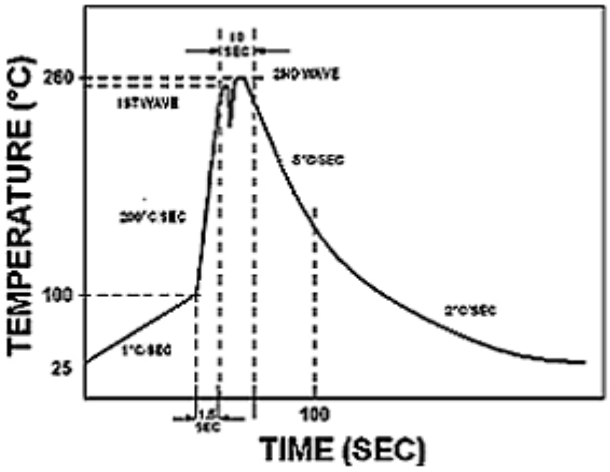


Reflow profiles in tabular form

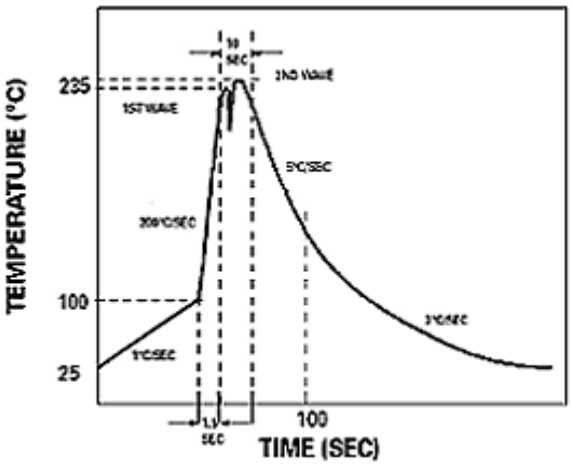
Profile Feature	Sn-Pb System	Pb-Free System
Average Ramp-Up Rate	~3°C/second	~3°C/second
Preheat – Temperature Range – Time	 150-170°C 60-180 seconds	 150-200°C 60-180 seconds
Time maintained above: – Temperature – Tim	 200°C 30-50 seconds	 217°C 60-150 seconds
Peak Temperature	235°C	260°C max.
Time 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.

TYPICAL CHARACTERISTIC CURVES

Fig. 1 Collector-Emitter Saturation Voltage v/s Collector current

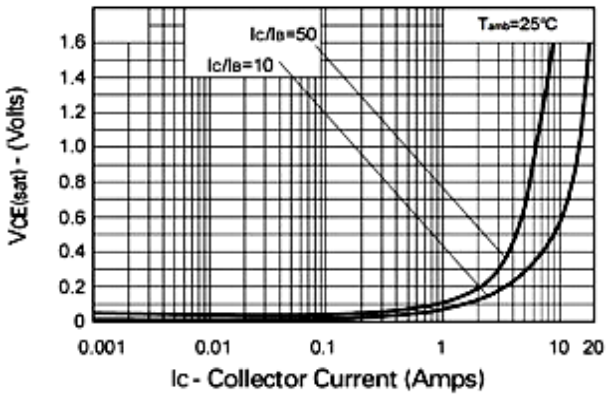


Fig 2. Gain v/s collector current

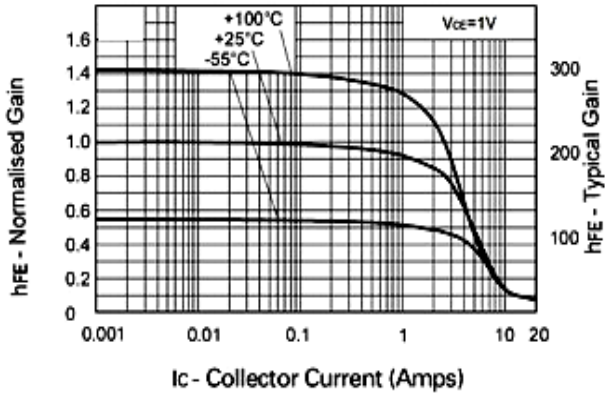


Fig 3. Collector-Base Saturation Voltage v/s Collector current

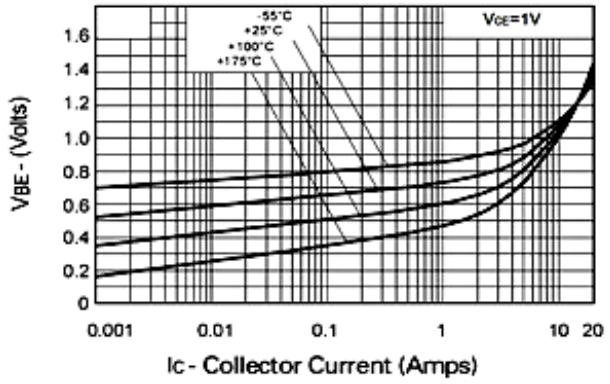


Fig 4. Collector-Emitter Saturation Voltage v/s Collector current

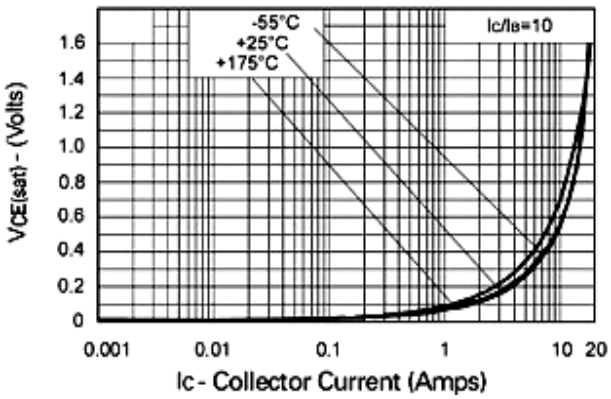
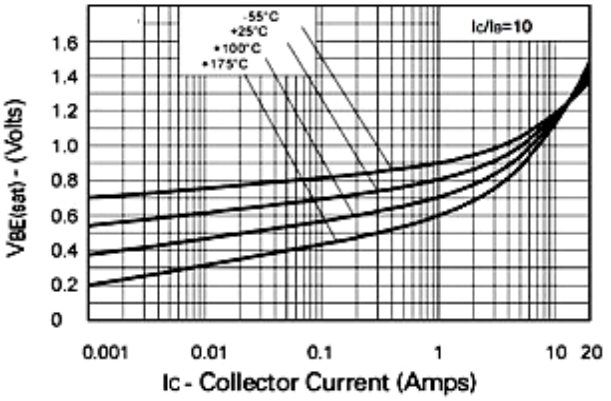


Fig 5. Collector-Base Saturation Voltage v/s Collector current



TYPICAL CHARACTERISTIC CURVES

Fig 6: Safe operating Area

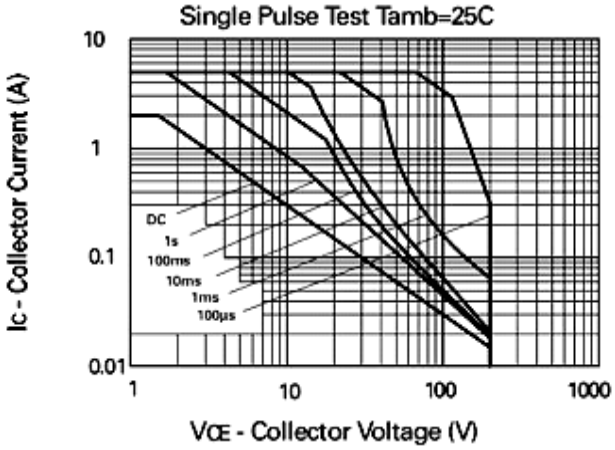


Fig 8: Derating curve

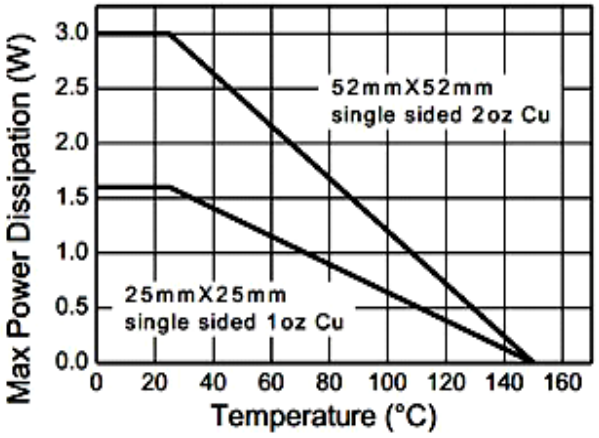


Fig 7. Transient Thermal Impedance

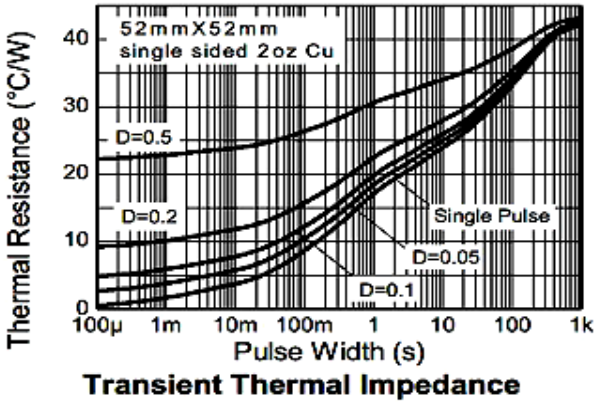
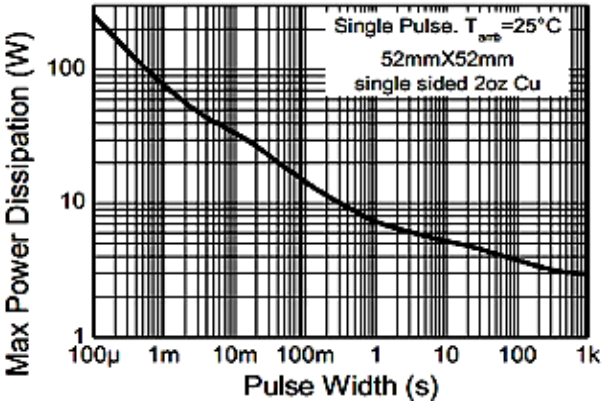
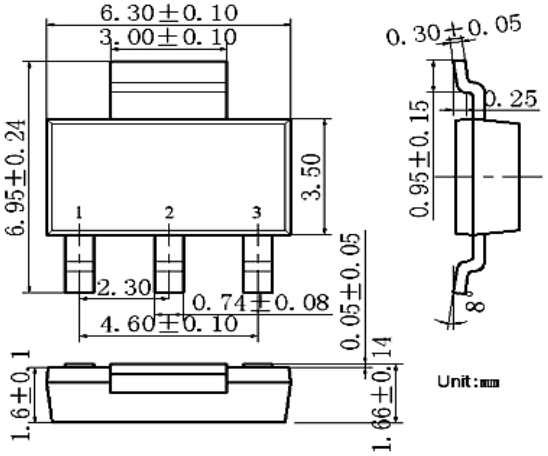


Fig 9. Pulse Power dissipation



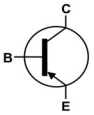
PACKAGE DETAILS

SOT-223 Surface Mount plastic package



Pin configuration

1. Base
2. Collector
3. Emitter



Recommended Product Storage Environment for Discrete Semiconductor Devices

This storage environment assumes that the Diodes and transistors are packed properly inside the original packing supplied by CDIL.

- Temperature 5 °C to 30 °C
- Humidity between 40 to 70 %RH
- Air should be clean.
- Avoid harmful gas or dust.
- Avoid outdoor exposure or storage in areas subject to rain or water spraying .
- Avoid storage in areas subject to corrosive gas or dust. Product shall not be stored in areas exposed to direct sunlight.
- Avoid rapid change of temperature.
- Avoid condensation.
- Mechanical stress such as vibration and impact shall be avoided.
- The product shall not be placed directly on the floor.
- The product shall be stored on a plane area. They should not be turned upside down. They should not be placed against the wall.

Shelf Life of CDIL Products

The shelf life of products is the period from product manufacture to shipment to customers. The product can

Floor Life of CDIL Products and MSL Level

When the products are opened from the original packing, the floor life will start.
For this, the following JEDEC table may be referred:

JEDEC MSL Level		
Level	**Time**	**Condition**
1	Unlimited	≤30 °C / 85% RH
2	1 Year	≤30 °C / 60% RH
2a	4 Weeks	≤30 °C / 60% RH
3	168 Hours	≤30 °C / 60% RH
4	72 Hours	≤30 °C / 60% RH
5	48 Hours	≤30 °C / 60% RH
5a	24 Hours	≤30 °C / 60% RH
6	Time on Label(TOL)	≤30 °C / 60% RH

Customer Notes

Component Disposal Instructions

1. CDIL Semiconductor Devices are RoHS compliant, customers are requested to please dispose as per prevailing Environmental Legislation of their Country.
2. In Europe, please dispose as per EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE).

Disclaimer

The product information and the selection guides facilitate selection of the CDIL's Semiconductor Device(s) best suited for application in your product(s) as per your requirement. It is recommended that you completely review our Data Sheet(s) so as to confirm that the Device(s) meet functionality parameters for your application. The information furnished in the Data Sheet and on the CDIL Web Site/CD are believed to be accurate and reliable. CDIL however, does not assume responsibility for inaccuracies or incomplete information. Furthermore, CDIL does not assume liability whatsoever, arising out of the application or use of any CDIL product; neither does it convey any license under its patent rights nor rights of others. These products are not designed for use in life saving/support appliances or systems. CDIL customers selling these products (either as individual Semiconductor Devices or incorporated in their end products), in any life saving/support appliances or systems or applications do so at their own risk and CDIL will not be responsible for any damages resulting from such sale(s).

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