



Continental Device India Pvt. Limited

An IATF 16949, ISO9001 and ISO 14001/ISO 45001 Certified Company



NPN/PNP Medium Power Transistors

BCX51/52/53 PNP
BCX54/55/56 NPN



SOT-89

SOT-89
Plastic Package
RoHS compliant

Device marking

Device part no. , e.g for device BCX51 : **BCX51**
for device BCX51-10 : **BCX51.10**
for device BCX51-16 : **BCX51.16**

GENERAL DESCRIPTION:

NPN/PNP complimentary medium power transistors in a SOT89 package.

FEATURE:

1. Low Collector-Emitter saturation voltage
2. High Current
3. High power dissipation capability
4. This product is available in AEC-Q101 Qualified and PPAP Capable also.

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

APPLICATIONS:

1. Linear voltage regulators
2. Driver Stages of Audio Amplifiers
3. High-side switches
4. Battery-driven devices
5. Power management
6. MOSFET drivers

ABSOLUTE MAXIMUM RATINGS (Ta = 25 °C Unless otherwise specified)

PARAMETER			SYMBOL	VALUE	UNIT
Collector-Base Voltage	BCX51	BCX54	V_{CBO}	45	V
	BCX52	BCX55		60	V
	BCX53	BCX56		100	V
Collector-Emitter Voltage	BCX51	BCX54	V_{CEO}	45	V
	BCX52	BCX55		60	V
	BCX53	BCX56		80	V
Emitter-Base Voltage			V_{EBO}	5.0	V
Collector Current			I_C	1.0	A
Peak collector current at single pulse; $t_p \leq 1$ ms			I_{CM}	2.0	A
Total power dissipation ¹			P_{tot}	500	mW
Thermal Resistance From Junction To Ambient			$R_{\theta JA}$	250	°C/W
Operation Junction and Storage Temperature Range			T_J, T_{stg}	-55 to +150	°C

Note:

1. Device mounted on an FR4 Printed-Circuit-Board (PCB); single-sided copper; tin-plated and standard footprint.

ELECTRICAL CHARACTERISTICS at (Ta = 25 °C Unless otherwise specified)

PARAMETER			SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Collector-base breakdown voltage	BCX51	BCX54	$V_{(BR)CBO}$	$I_C=100\mu A, I_E=0$	45	--	--	V
	BCX52	BCX55			60	--	--	V
	BCX53	BCX56			100	--	--	V
Collector-emitter breakdown voltage	BCX51	BCX54	$V_{(BR)CEO}^1$	$I_C=10mA, I_B=0$	45	--	--	V
	BCX52	BCX55			60	--	--	V
	BCX53	BCX56			80	--	--	V
Emitter-base breakdown voltage			$V_{(BR)EBO}$	$I_E=100\mu A, I_C=0$	5	--	--	V
Collector cut-off current			I_{CBO}	$V_{CB}=30V, I_E=0$	--	--	0.1	μA
Emitter cut-off current			I_{EBO}	$V_{EB}=5V, I_C=0$	--	--	0.1	μA
DC current gain			$h_{FE(1)}^1$	$V_{CE}=2V, I_C=5mA$	63	--	--	
			$h_{FE(2)}^1$	$V_{CE}=2V, I_C=150mA$	63	--	250	
			$h_{FE(3)}^1$	$V_{CE}=2V, I_C=0.5A$	40	--	--	
Collector-emitter saturation voltage			$V_{CE(sat)}^1$	$I_C=0.5A, I_B=50mA$	--	--	0.5	V
Base -emitter voltage			V_{BE}^1	$V_{CE}=2V, I_C=0.5A$	--	--	1.0	V
Transition frequency			f_T	$V_{CE}=5V, I_C=50mA,$ $f=100MHz, T_{amb} = 25\text{ }^{\circ}C$	--	145	--	MHz

Note: 1. Pulse Test

2. For PNP device voltage and current values will be negative (-).

CLASSIFICATION OF $h_{FE(2)}$

h_{FE} RANGE	63–250	63–160	100–250
Devices	BCX51	BCX51-10	BCX51-16
	BCX52	BCX52-10	BCX52-16
	BCX53	BCX53-10	BCX53-16
	BCX54	BCX54-10	BCX54-16
	BCX55	BCX55-10	BCX55-16
	BCX56	BCX56-10	BCX56-16

BCX51_56

Rev2_22012025JS

TYPICAL CHARACTERISTICS CURVES

Fig 1: Static Characteristic

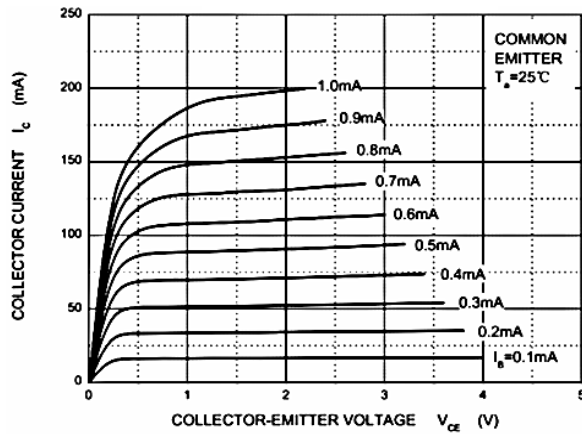


Fig 2: Base-Emitter Saturation voltage vs Collector Current

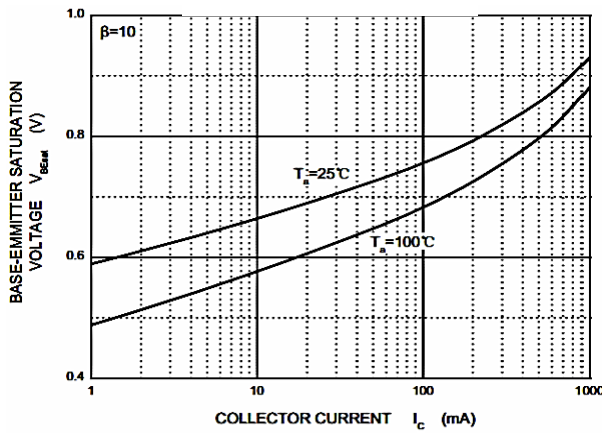


Fig 3: DC current gain vs Collector Current

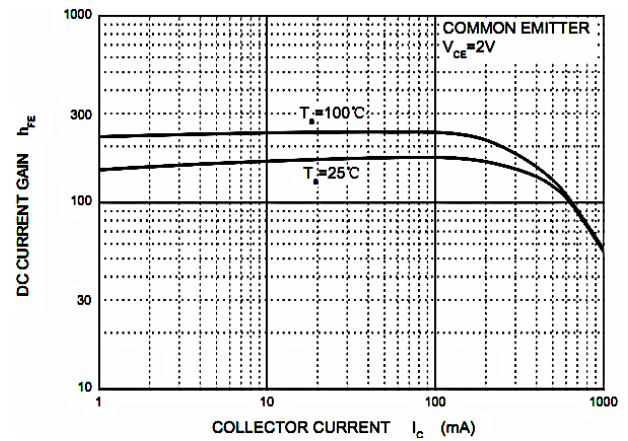
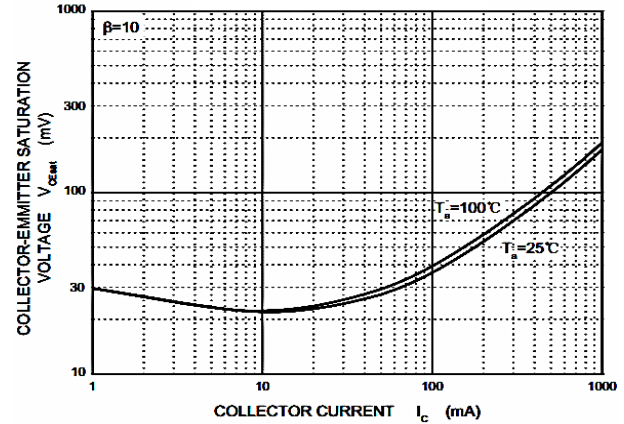


Fig 4: Collector-emitter saturation voltage vs Collector Current



TYPICAL CHARACTERISTICS CURVES

Fig 5: Transition frequency vs Collector Current

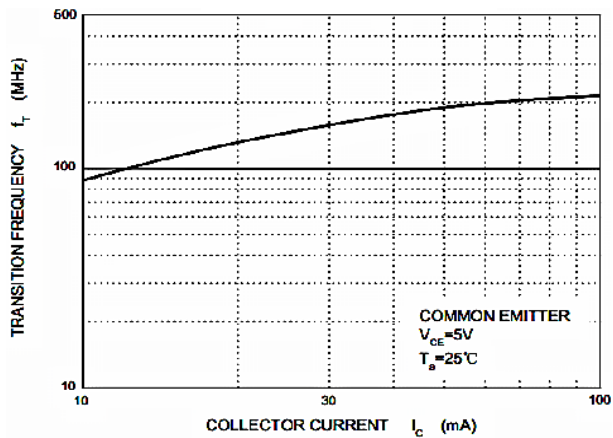


Fig 7: Capacitance vs Reverse Voltage

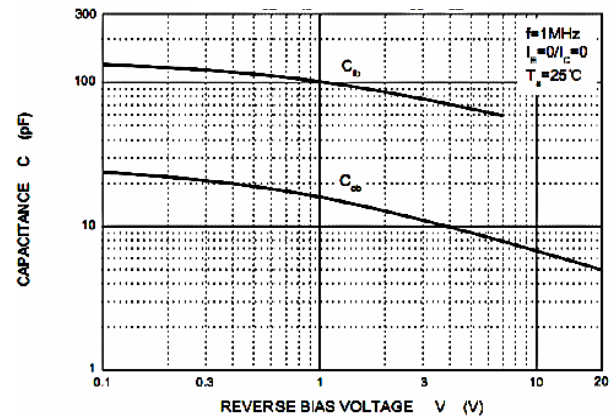


Fig 6: Collector Current vs Base-Emitter voltage

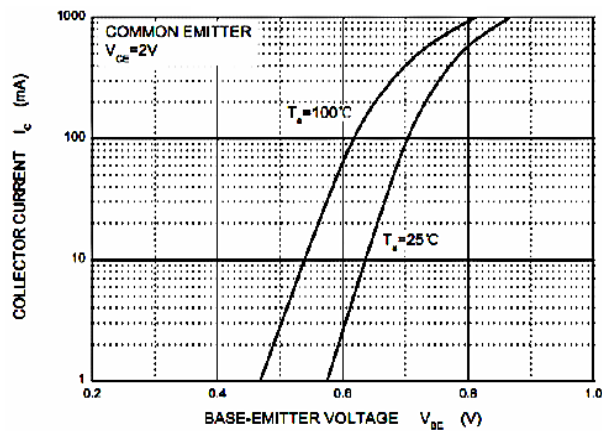
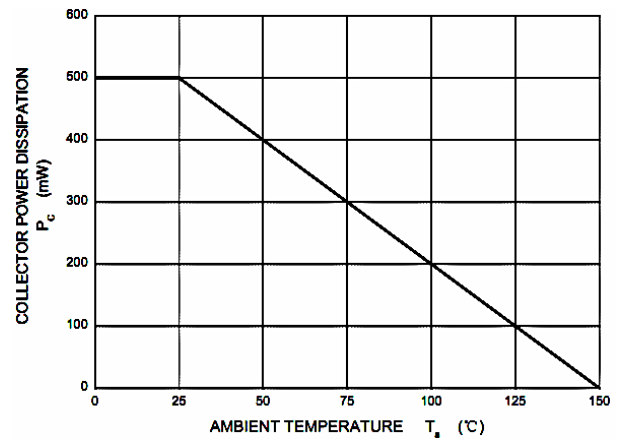
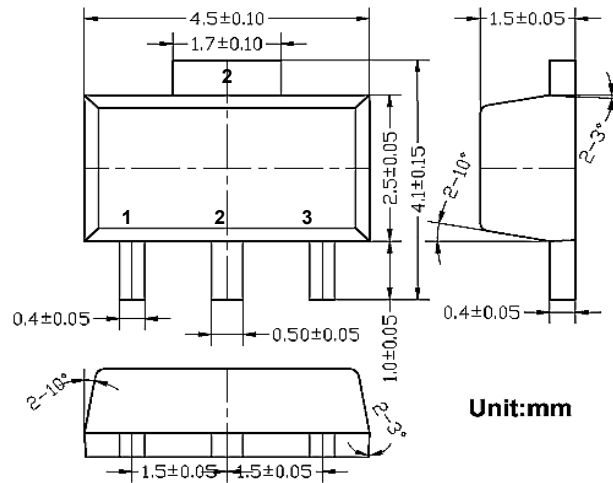


Fig 8: Collector Power Dissipation vs Ambient Temperature



PACKAGE DETAILS

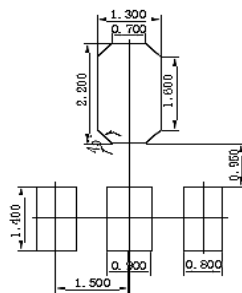
SOT-89 Plastic Package



PIN CONFIGURATION

1. Base
2. Collector
3. Emitter

SOT-89 Suggested Pad Layout



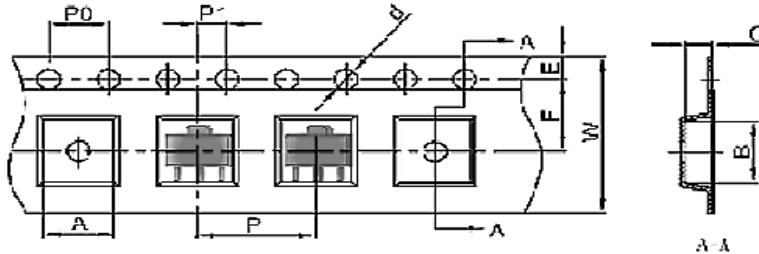
Note:

1. Controlling dimensions: in millimeters.
2. General Tolerance: ± 0.05 mm
3. The pad layout is for reference purposes only.

All dimensions are in mm

SOT-89 Tape and Reel

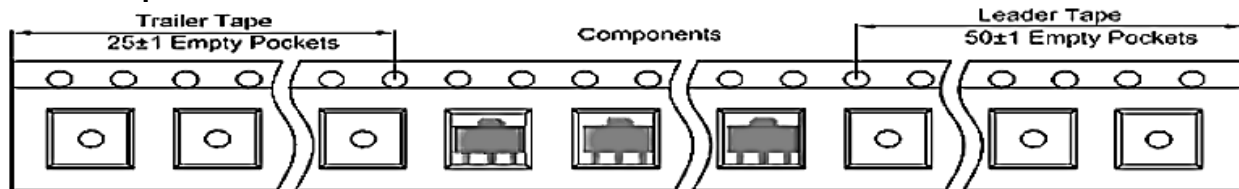
SOT-89 Embossed Carrier Tape



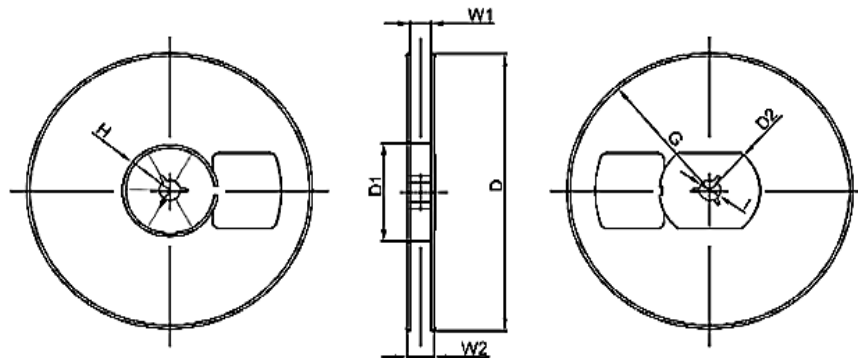
SOT-89 Parts are shipped in tape. The carrier tape is made from a disposable (carbon filled) polycarbonate resin. The cover tape is a multiplayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-Static sprayed agent. these reeled parts in standard option are shipped with 3000 units per 7" or 17.8cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated)

Dimensions are in millimeter										
Pkg type	A	B	C	d	E	F	P0	P	P1	W
SOT-89-3L	4.85	4.45	1.85	Ø1.50	1.75	5.50	4.00	8.00	2.00	12.00

SOT-89 Tape Leader and Trailer



SOT - 89 Reel



Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
7" Dia	Ø180.00	60.00	R32.00	R86.50	R30.00	Ø13.00	13.20	18.50
REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)		
1000 pcs	7 inch	10,000 pcs	203×203×195	40,000 pcs	438×438×220			

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

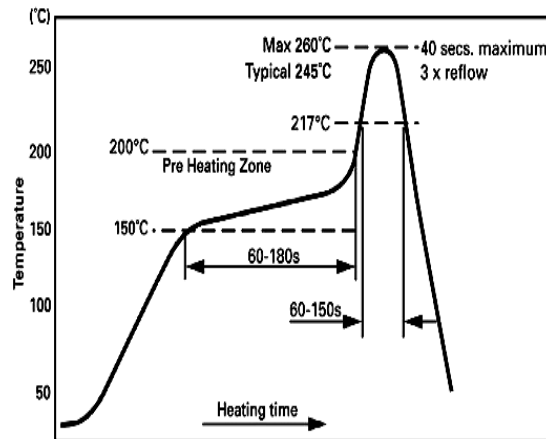
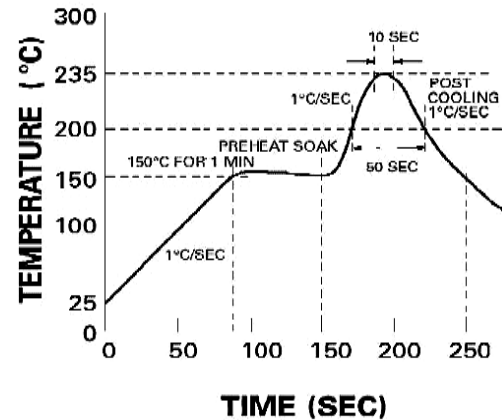


Figure 2

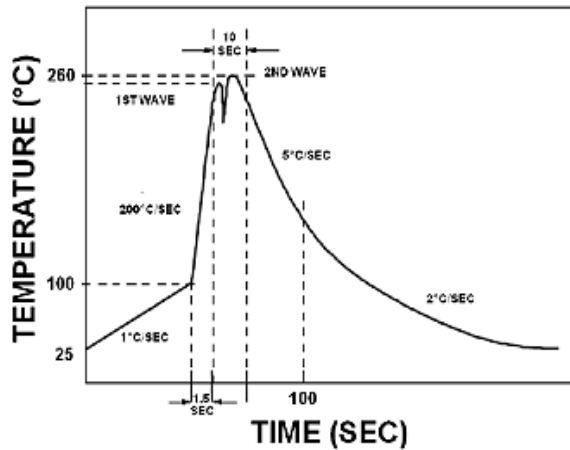


Reflow profiles in tabular form

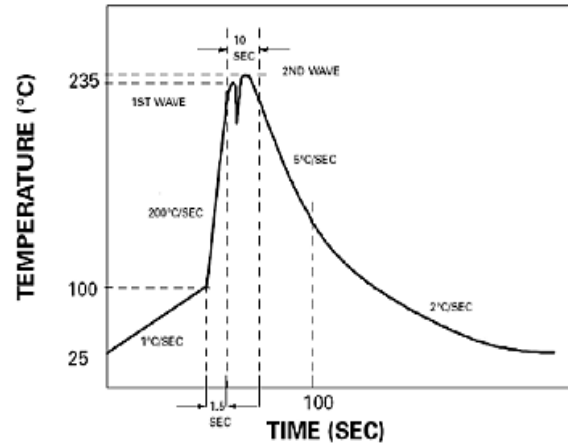
Profile Feature	Sn-Pb System	Pb-Free System
Average Ramp-Up Rate	~3°C/second	~3°C/second
Preheat		
– Temperature Range	150-170°C	150-200°C
– Time	60-180 seconds	60-180 seconds
Time maintained above:		
– Temperature	200°C	217°C
– Time	30-50 seconds	60-150 seconds
Peak Temperature	235°C	260°C max.
Time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



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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 be unconditionally shipped within this period. The period is defined as 2 years.

If products are stored longer than the shelf life of 2 years the products shall be subjected to quality check as per CDIL quality procedure.

The products are further warranted for another one year after the date of shipment subject to the above conditions in CDIL original packing.

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



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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). CDIL strives for continuous improvement and reserves the right to change the specifications of its products without prior notice.



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