

SMALL SIGNAL COMPLEMENTARY PRE-BIASED DUAL TRANSISTOR

Features

- Epitaxial Planar Die Construction
- Built-In Biasing Resistors
- Surface Mount Package Suited for Automated Assembly
- **Totally Lead-Free & Fully RoHS compliant (Note 1)**
- **Halogen and Antimony Free. "Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Part Number	R1 (NOM)	R2 (NOM)
DCX124EU	22K Ω	22K Ω
DCX144EU	47K Ω	47K Ω
DCX114YU	10K Ω	47K Ω
DCX123JU	2.2K Ω	47K Ω
DCX114EU	10K Ω	10K Ω
DCX143EU	4.7K Ω	4.7K Ω

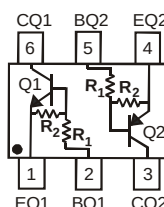
Mechanical Data

- Case: SOT363
- Case material: Molded Plastic. "Green" Molding Compound.
- Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish
- Weight: 0.006 grams (approximate)

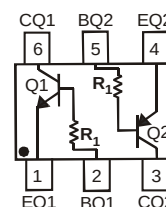
Part Number	R1 Only
DCX143TU	4.7K Ω
DCX114TU	10K Ω



Top View



R1, R2



R1 Only

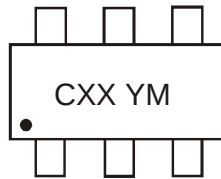
Device Schematic

Ordering Information (Note 3 & 4)

Product	Grade	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DCX124EU-7-F	Commercial	C17	7	8	3,000
DCX124EUQ-7-F	Automotive	C17	7	8	3,000
DCX124EUQ-13-F	Automotive	C17	13	8	10,000
DCX124EUQ-13R-F	Automotive	C17	13	8	10,000
DCX144EU-7-F	Commercial	C20	7	8	3,000
DCX144EU-7R-F	Commercial	C20	7	8	3,000
DCX144EUQ-7-F	Automotive	C20	7	8	3,000
DCX114YU-7-F	Commercial	C14	7	8	3,000
DCX114YUQ-7-F	Automotive	C14	7	8	3,000
DCX114YUQ-13-F	Automotive	C14	13	8	10,000
DCX114YUQ-13R-F	Automotive	C14	13	8	10,000
DCX123JU-7-F	Commercial	C06	7	8	3,000
DCX114EU-7-F	Commercial	C13	7	8	3,000
DCX114EUQ-7-F	Automotive	C13	7	8	3,000
DCX114EUQ-13-F	Automotive	C13	13	8	10,000
DCX143TU-7-F	Commercial	C07	7	8	3,000
DCX143EU-7-F	Commercial	C08	7	8	3,000
DCX114TU-7-F	Commercial	C12	7	8	3,000

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. Halogen and Antimony free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 3. -7R and -13R are parts rotated in the pocket tape by 180°. For packaging details, go to our website at <http://www.diodes.com>.
 4. Products with Q-suffix are automotive grade. Automotive products are electrical and thermal the same as the commercial, except where specified.

Marking Information



CXX = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: X = 2010)
M = Month (ex: 9 = September)

Date Code Key

Year	2010	2011	2012	2013	2014	2015	2016	2017
Code	X	Y	Z	A	B	C	D	E

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

Maximum Ratings NPN Section @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Supply Voltage <Pin: (6) to (1)>	V _{CC}	50	V
Input Voltage <Pin: (2) to (1)>	V _{IN}	-10 to +40 -10 to +40 -6 to +40 -5 to +12 -10 to +40 -5V max -10 to +30 -5V max	V
Output Current	I _O	30 30 70 100 50 100 100 100	mA
Output Current	I _C (Max)	100	mA

Maximum Ratings PNP Section @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Supply Voltage <Pin: (4) to (3)>	V _{CC}	50	V
Input Voltage <Pin: (5) to (4)>	V _{IN}	+10 to -40 +10 to -40 +6 to -40 +5 to -12 +10 to -40 +5V max +10 to -30 +5V max	V
Output Current	I _O	-30 -30 -70 -100 -50 -100 -100 -100	mA
Output Current	I _C (Max)	-100	mA

Thermal Characteristics @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5 & 6)	P _D	100	mW
Thermal Resistance, Junction to Ambient Air (Note 5)	R _{θJA}	625	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

Notes: 5. Mounted on FR4 PC Board with minimum recommended pad layout
6. 150mW per element must not be exceeded.

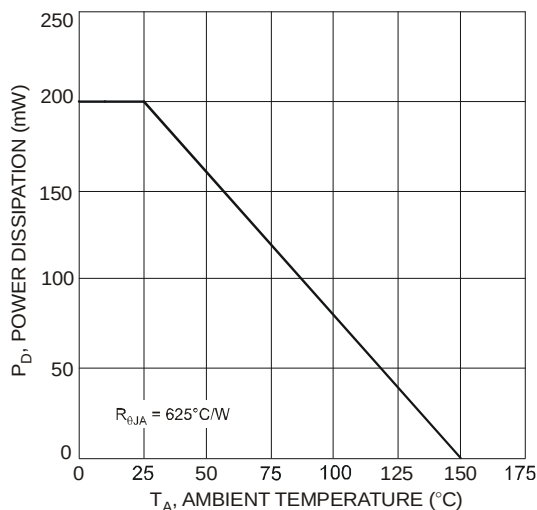
Electrical Characteristics NPN Section @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
R1 Only (DCX143TU & DCX114TU)						
Collector-Base Breakdown Voltage	BV _{CBO}	50	—	—	V	I _C = 50μA
Collector-Emitter Breakdown Voltage	BV _{CEO}	50	—	—	V	I _C = 1mA
Emitter-Base Breakdown Voltage	BV _{EBO}	5	—	—	V	I _E = 50μA
Collector Cutoff Current	I _{CBO}	—	—	0.5	μA	V _{CB} = 50V
Emitter Cutoff Current	I _{EBO}	—	—	0.5	μA	V _{EB} = 4V
Collector-Emitter Saturation Voltage	V _{CE(sat)}	—	—	0.3	V	I _C /I _B = 2.5mA / 0.25mA DCX143TU I _C /I _B = 1mA / 0.1mA DCX114TU
DC Current Transfer Ratio	h _{FE}	100	250	600	—	I _C = 1mA, V _{CE} = 5V
Input Resistor (R ₁) Tolerance	ΔR ₁	-30	—	+30	%	—
Gain-Bandwidth Product	f _T	—	250	—	MHz	V _{CE} = 10V, I _E = -5mA, f = 100MHz
R1/R2 Only						
Input Voltage	DCX124EU	V _{I(off)}	0.5	1.1	—	V _{CC} = 5V, I _O = 100μA
	DCX144EU		0.5	1.1		
	DCX114YU		0.3	-		
	DCX123JU		0.5	-		
	DCX114EU		0.5	1.1		
	DCX143EU		0.5	1.16		
	DCX124EU	V _{I(on)}	—	1.9	V	V _O = 0.3, I _O = 5mA
	DCX144EU		—	1.9		V _O = 0.3, I _O = 2mA
	DCX114YU		—	-		V _O = 0.3, I _O = 1mA
	DCX123JU		—	-		V _O = 0.3, I _O = 5mA
	DCX114EU		—	1.9		V _O = 0.3, I _O = 10mA
	DCX143EU		—	1.99		V _O = 0.3, I _O = 20mA
Output Voltage	DCX124EU	V _{O(on)}	—	0.1	V	I _O /I _I = 10mA / 0.5mA
	DCX144EU					I _O /I _I = 10mA / 0.5mA
	DCX114YU					I _O /I _I = 5mA / 0.25mA
	DCX123JU					I _O /I _I = 5mA / 0.25mA
	DCX114EU					I _O /I _I = 10mA / 0.5mA
	DCX143EU					I _O /I _I = 10mA / 0.5mA
Input Current	DCX124EU	I _I	—	—	mA	V _I = 5V
	DCX144EU					
	DCX114YU					
	DCX123JU					
	DCX114EU					
	DCX143EU					
Output Current	I _{O(off)}	—	—	0.5	μA	V _{CC} = 50V, V _I = 0V
DC Current Gain	DCX124EU	G _I	56	—	—	V _O = 5V, I _O = 5mA
	DCX124EUQ		60			V _O = 5V, I _O = 5mA
	DCX144EU		68			V _O = 5V, I _O = 5mA
	DCX114YU		68			V _O = 5V, I _O = 10mA
	DCX114YUQ		80			V _O = 5V, I _O = 10mA
	DCX123JU		80			V _O = 5V, I _O = 10mA
	DCX114EU		30			V _O = 5V, I _O = 5mA
	DCX143EU		50			V _O = 5V, I _O = 10mA
Input Resistor (R ₁) Tolerance	ΔR ₁	-30	—	+30	%	—
Resistance Ratio Tolerance	R ₂ /R ₁	-20	—	+20	%	—
Gain-Bandwidth Product	f _T	—	250	—	MHz	V _{CE} = 10V, I _E = 5mA, f = 100MHz

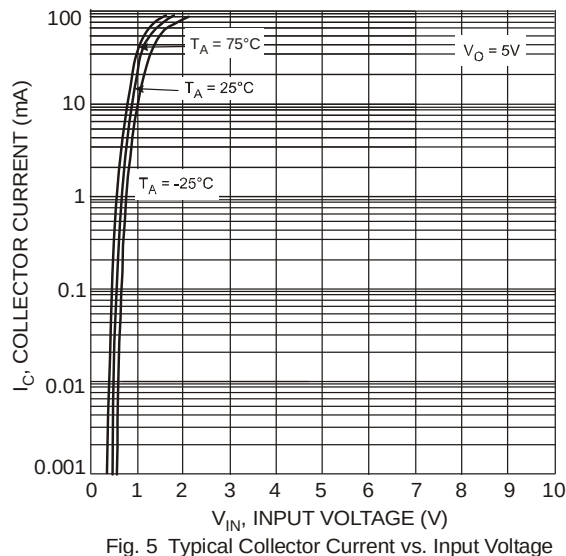
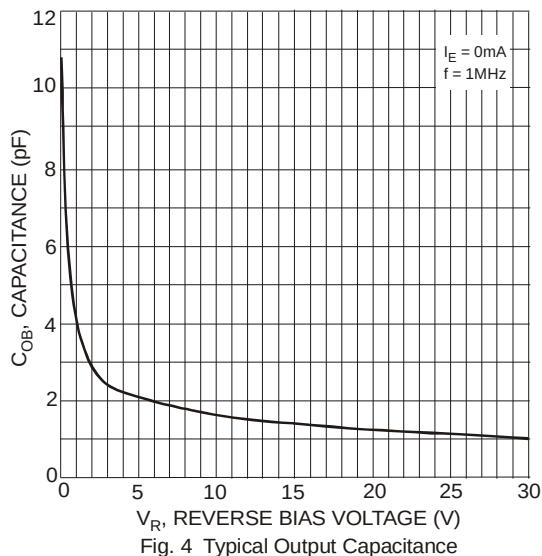
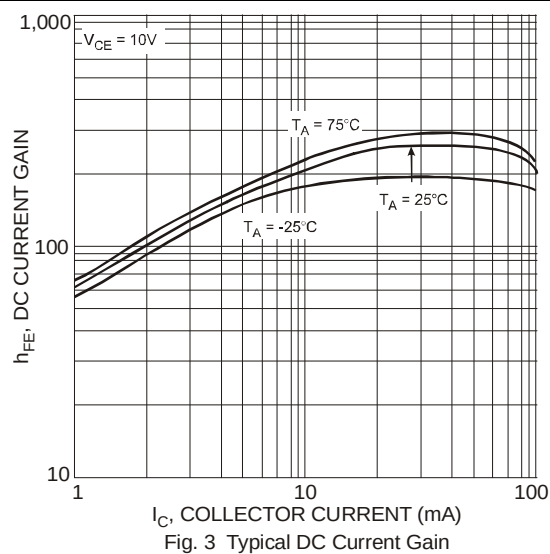
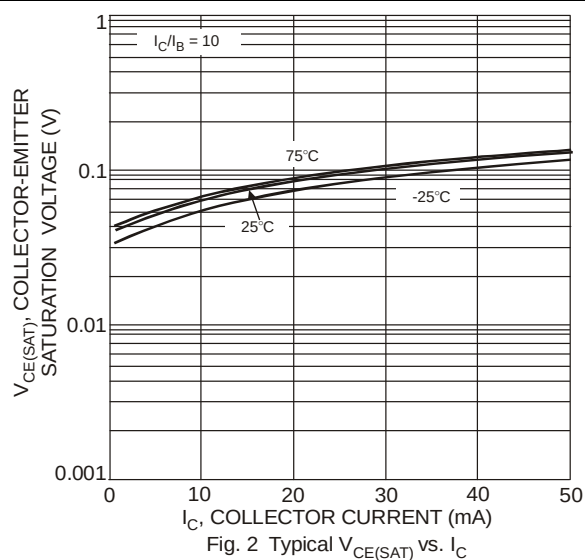
Electrical Characteristics PNP Section @T_A = 25°C unless otherwise specified

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
R1 Only (DCX143TU & DCX114TU)							
Collector-Base Breakdown Voltage		BV _{CBO}	-50	—	—	V	I _C = -50μA
Collector-Emitter Breakdown Voltage		BV _{CEO}	-50	—	—	V	I _C = -1mA
Emitter-Base Breakdown Voltage		BV _{EBO}	-5	—	—	V	I _E = -50μA
Collector Cutoff Current		I _{CBO}	—	—	-0.5	μA	V _{CB} = -50V
Emitter Cutoff Current		I _{EBO}	—	—	-0.5	μA	V _{EB} = -4V
Collector-Emitter Saturation Voltage		V _{CE(sat)}	—	—	-0.3	V	I _C /I _B = 2.5mA / 0.25mA DCX143TU I _C /I _B = 1mA / 0.1mA DCX114TU
DC Current Transfer Ratio		h _{FE}	100	250	600	—	I _C = -1mA, V _{CE} = -5V
Input Resistor (R ₁) Tolerance		ΔR ₁	-30	—	+30	%	—
Gain-Bandwidth Product		f _T	—	250	—	MHz	V _{CE} = -10V, I _E = 5mA, f = 100MHz
R1/R2 Only							
Input Voltage	DCX124EU	V _{I(off)}	-0.5	-1.1	—	V	V _{CC} = -5V, I _O = -100μA
	DCX144EU		-0.5	-1.1			
	DCX114YU		-0.3	-			
	DCX123JU		-0.5	-			
	DCX114EU		-0.5	-1.1			
	DCX143EU		-0.5	-1.16			
	DCX124EU	V _{I(on)}	—	-1.9	-3.0		V _O = -0.3, I _O = -5mA
	DCX144EU			-1.9	-3.0		V _O = -0.3, I _O = -2mA
	DCX114YU			-	-1.4		V _O = -0.3, I _O = -1mA
	DCX123JU			-	-1.1		V _O = -0.3, I _O = -5mA
	DCX114EU			-1.9	-3.0		V _O = -0.3, I _O = -10mA
	DCX143EU			-2.5	-3.0		V _O = -0.3, I _O = -20mA
Output Voltage	DCX124EU	V _{O(on)}	—	-0.1	-0.3	V	I _O /I _I = -10mA / -0.5mA
	DCX144EU						I _O /I _I = -10mA / -0.5mA
	DCX114YU						I _O /I _I = -5mA / -0.25mA
	DCX123JU						I _O /I _I = -5mA / -0.25mA
	DCX114EU						I _O /I _I = -10mA / -0.5mA
	DCX143EU						I _O /I _I = -10mA / -0.5mA
Input Current	DCX124EU	I _I	—	—	-0.36	mA	V _I = -5V
	DCX144EU				-0.18		
	DCX114YU				-0.88		
	DCX123JU				-3.6		
	DCX114EU				-0.88		
	DCX143EU				-0.88		
Output Current		I _{O(off)}	—	—	-0.5	μA	V _{CC} = 50V, V _I = 0V
DC Current Gain	DCX124EU	G _I	56	—	—	—	V _O = -5V, I _O = -5mA
	DCX124EUQ		60				V _O = -5V, I _O = -5mA
	DCX144EU		68				V _O = -5V, I _O = -5mA
	DCX114YU		68				V _O = -5V, I _O = -10mA
	DCX114YUQ		80				V _O = -5V, I _O = -10mA
	DCX123JU		80				V _O = -5V, I _O = -10mA
	DCX114EU		30				V _O = -5V, I _O = -5mA
	DCX143EU		40				V _O = -5V, I _O = -10mA
Input Resistor (R ₁) Tolerance		ΔR ₁	-30	—	+30	%	—
Resistance Ratio Tolerance		R ₂ /R ₁	-20	—	+20	%	—
Gain-Bandwidth Product		f _T	—	250	—	MHz	V _{CE} = -10V, I _E = -5mA, f = 100MHz

Typical Curves – Total Device



Typical Curves – DCX123JU PNP Section



Typical Curves – DCX123JU PNP Section (cont.)

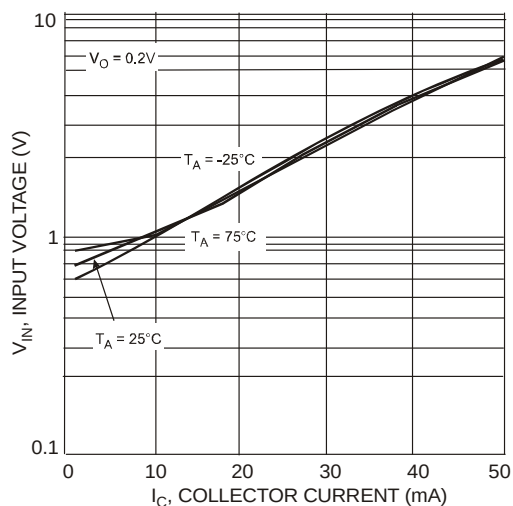


Fig. 6 Typical Input Voltage vs. Collector Current

Typical Curves – DCX123JU NPN Section

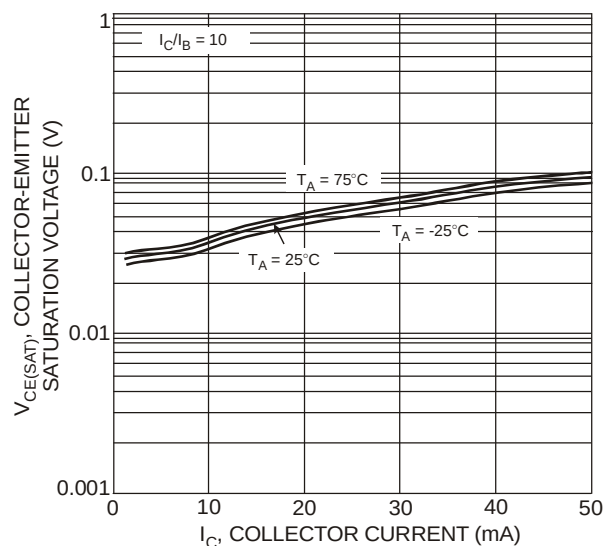


Fig. 7 Typical $V_{CE(SAT)}$ vs. I_C

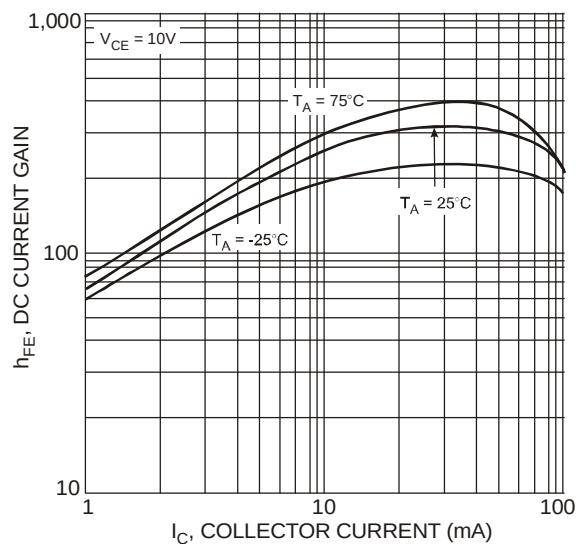


Fig. 8 Typical DC Current Gain

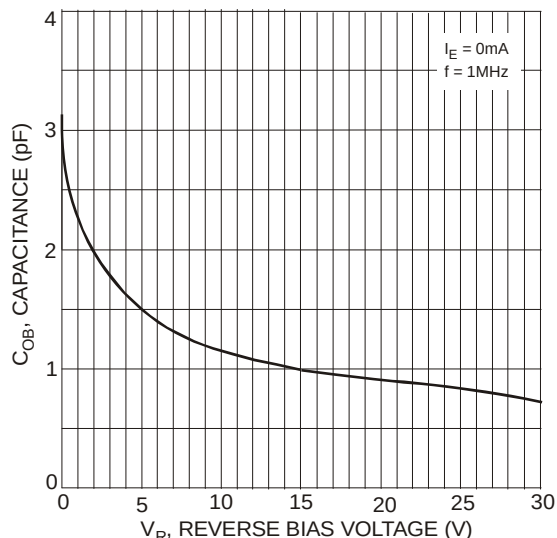


Fig. 9 Typical Output Capacitance

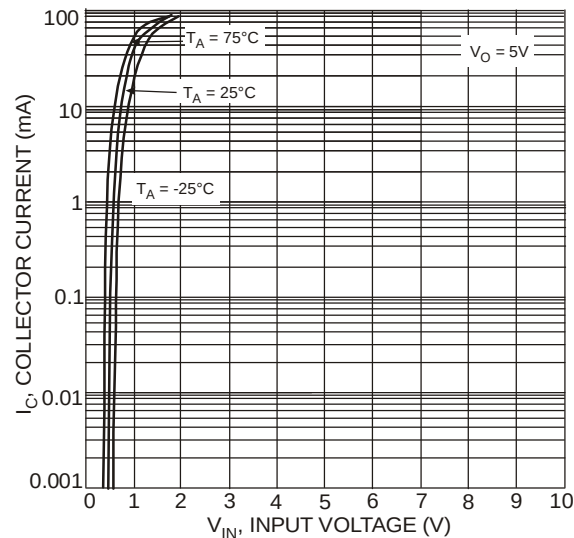
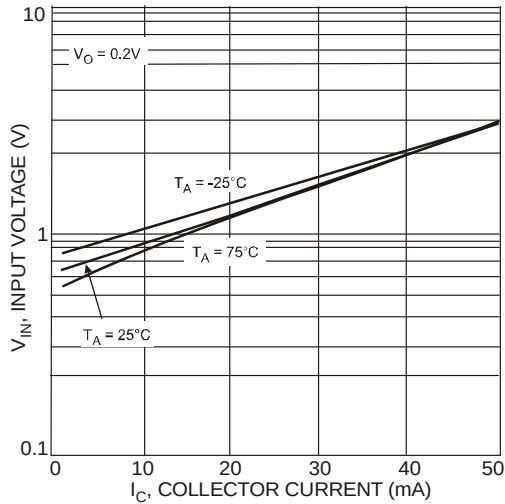
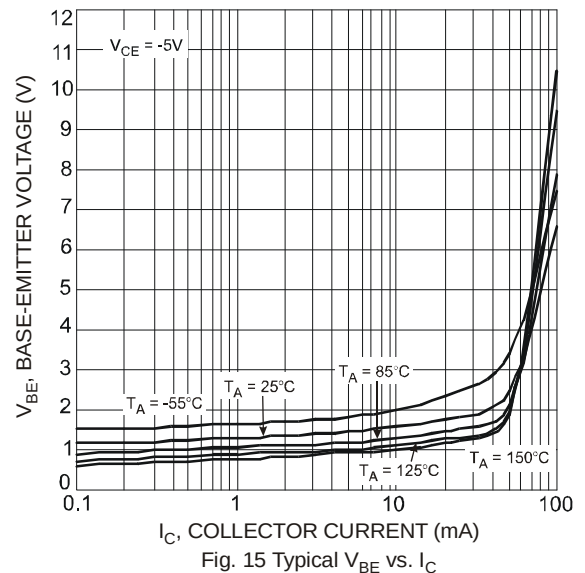
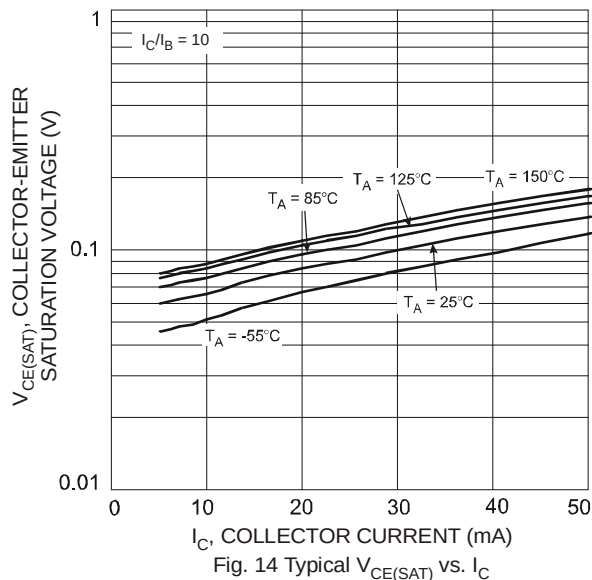
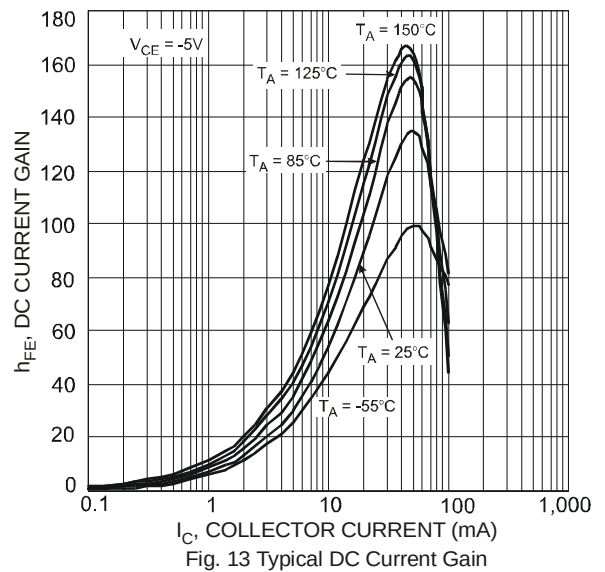
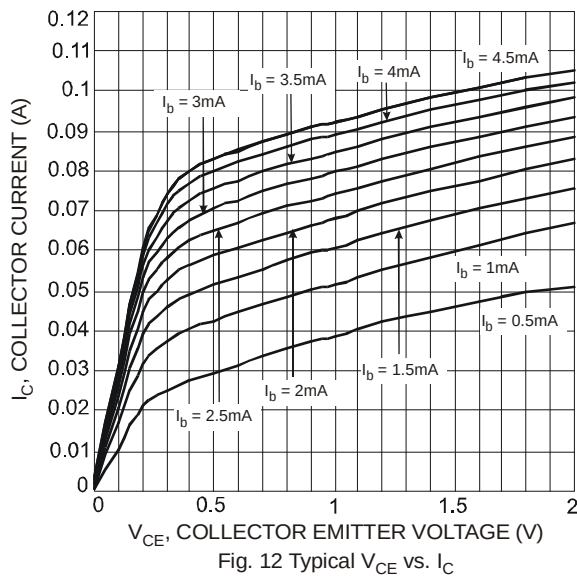


Fig. 10 Typical Collector Current vs. Input Voltage

Typical Curves – DCX123JU NPN Section (cont.)



Typical Curves – DCX143EU PNP Section



Typical Curves – DCX143EU PNP Section (cont.)

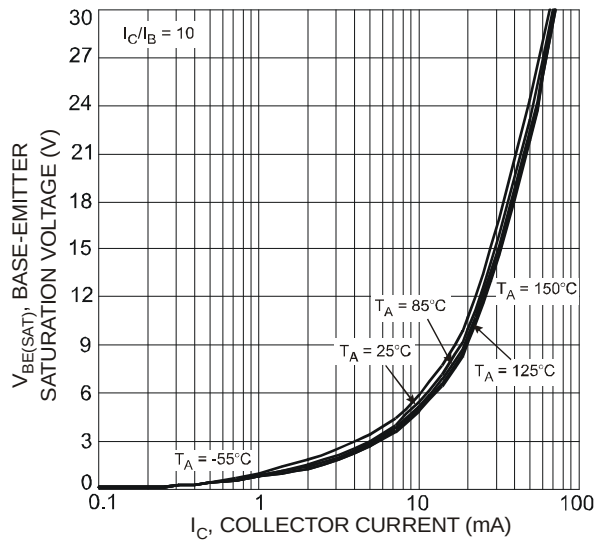


Fig. 16 Typical $V_{BE(SAT)}$ vs. I_C

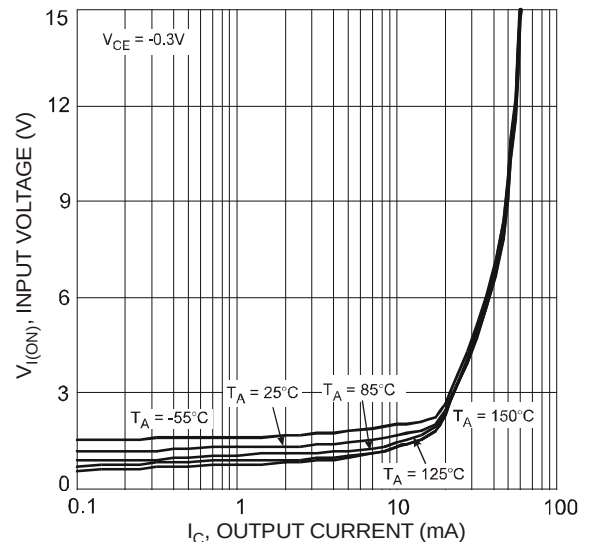


Fig. 17 Typical $V_{I(ON)}$ vs. I_C

Typical Curves – DCX143EU NPN Section

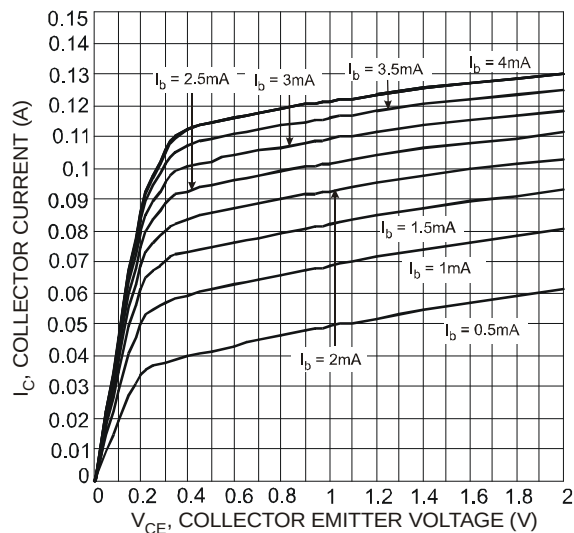


Fig. 18 Typical V_{CE} vs. I_C

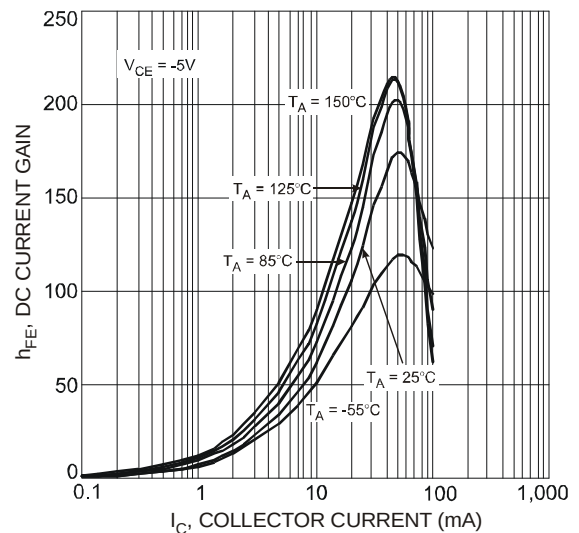


Fig. 19 Typical DC Current Gain

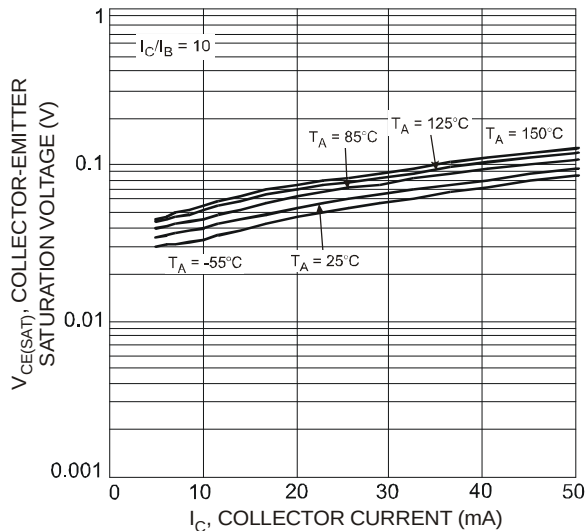


Fig. 20 Typical $V_{CE(SAT)}$ vs. I_C

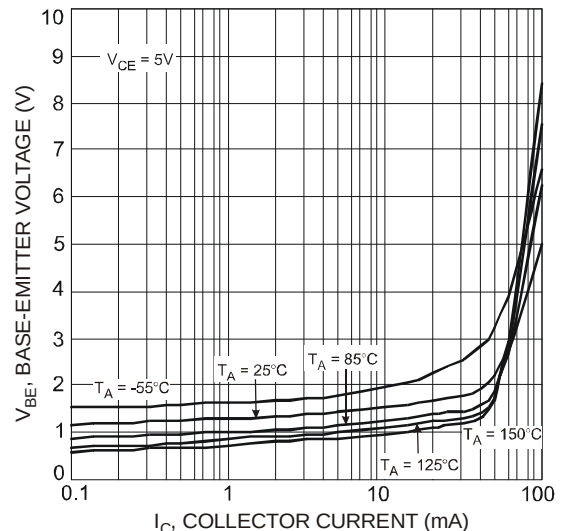
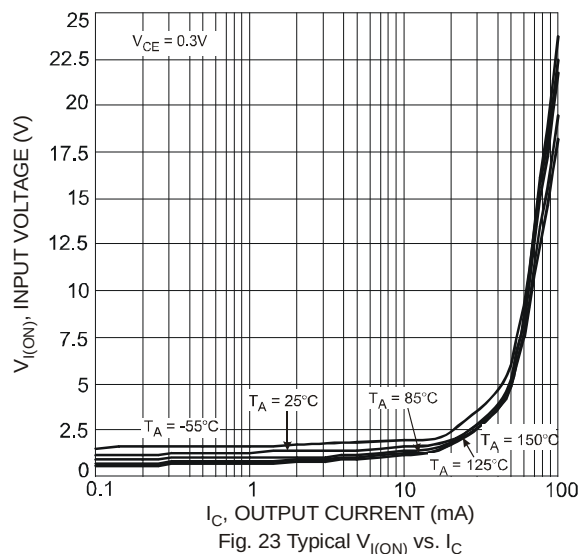
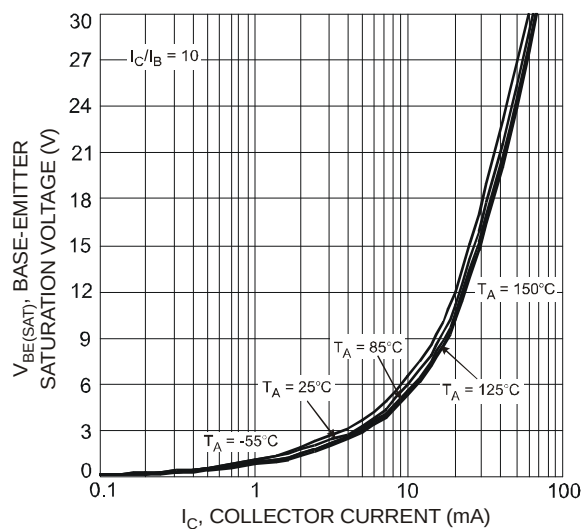
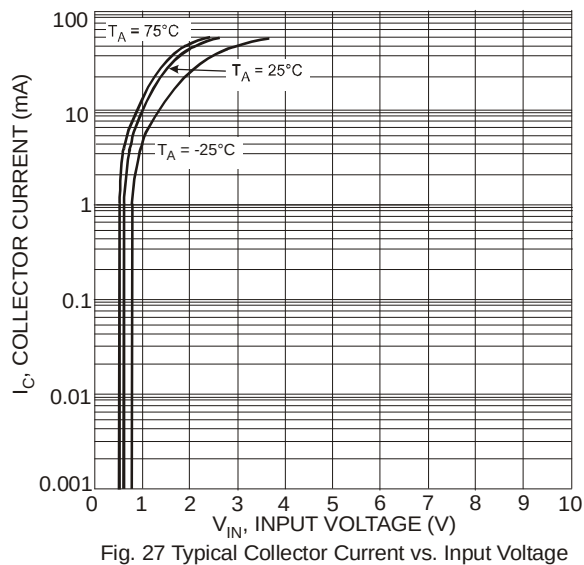
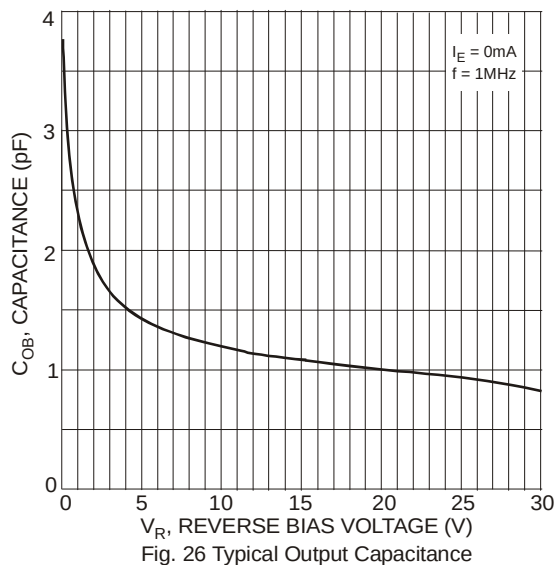
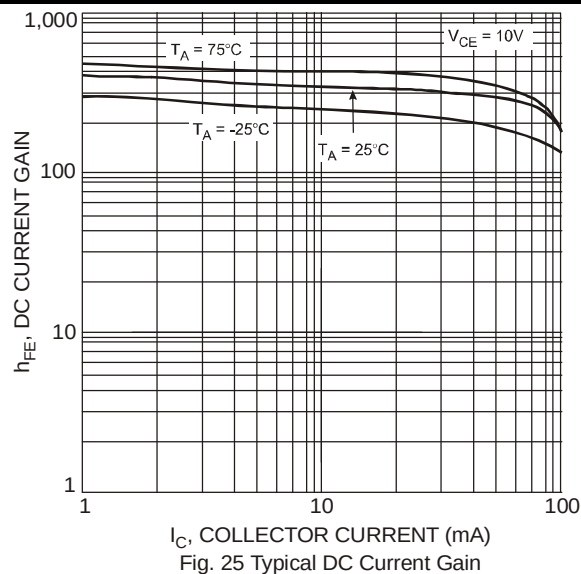
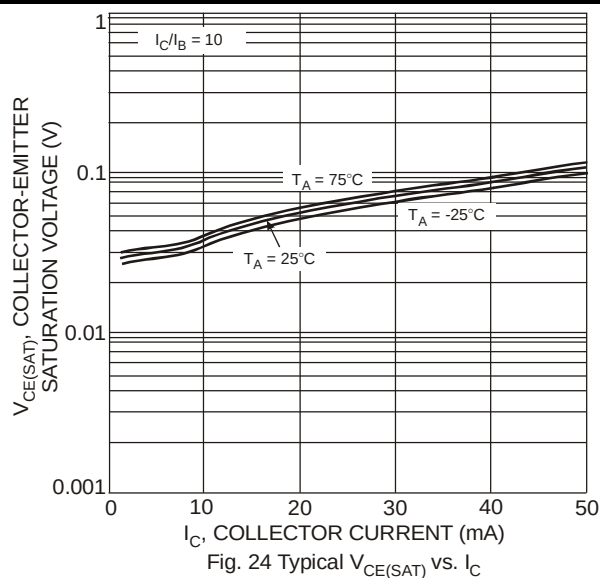


Fig. 21 Typical V_{BE} vs. I_C

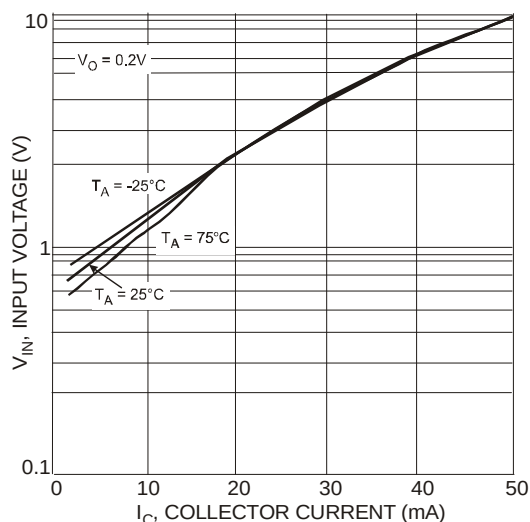
Typical Curves – DCX143EU NPN Section (cont.)



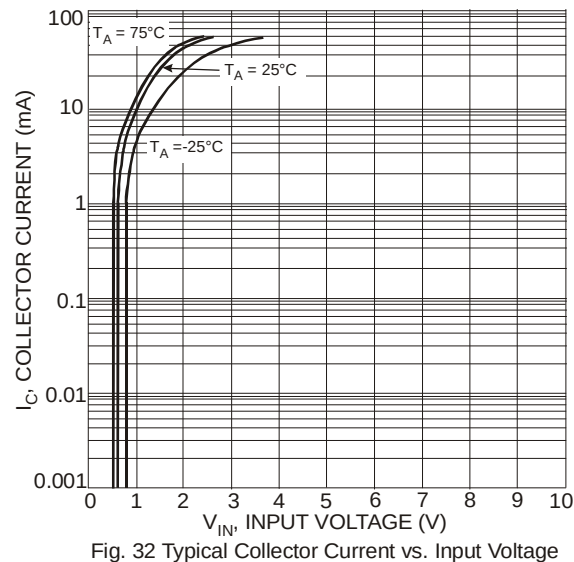
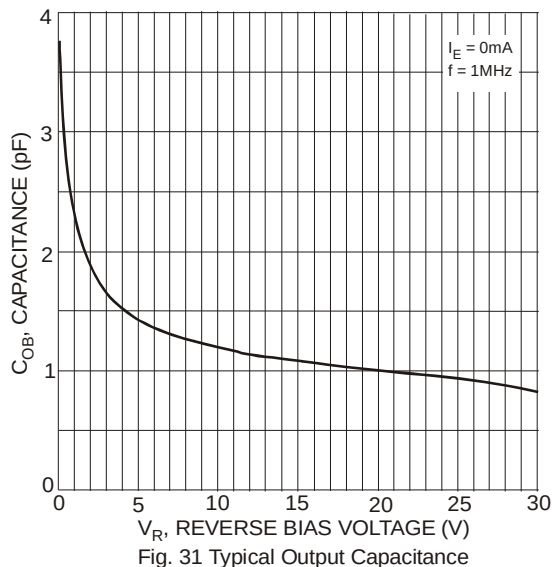
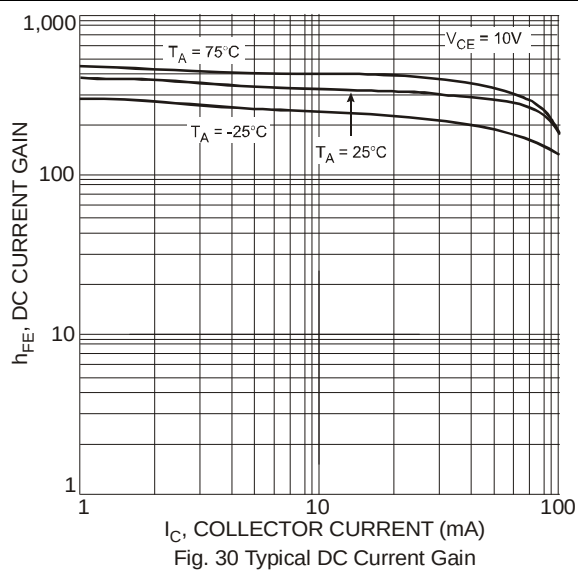
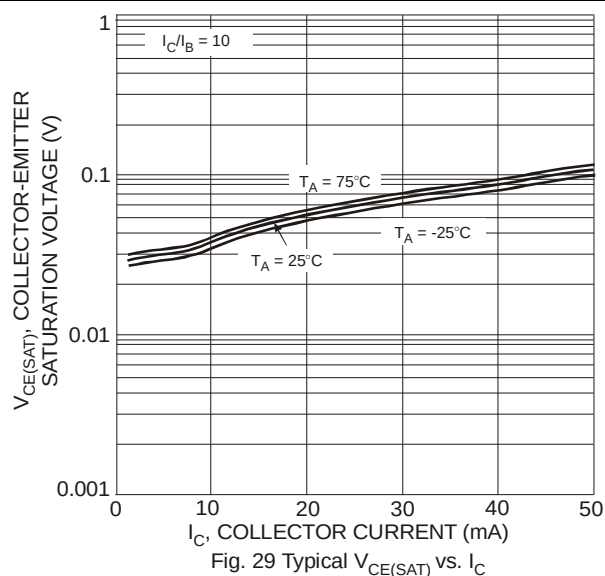
Typical Curves – DCX114TU PNP Section



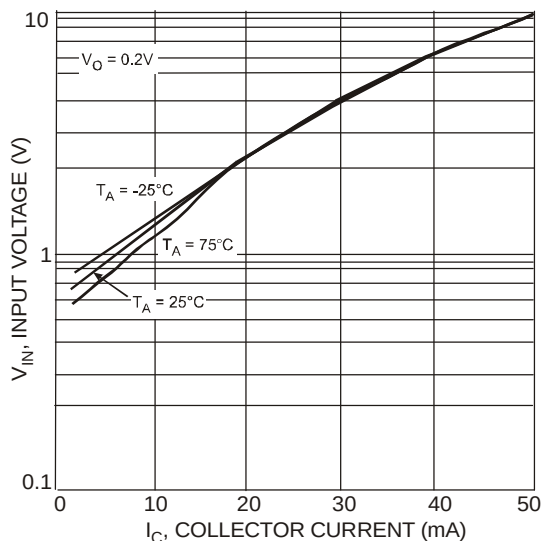
Typical Curves – DCX114TU PNP Section (cont.)



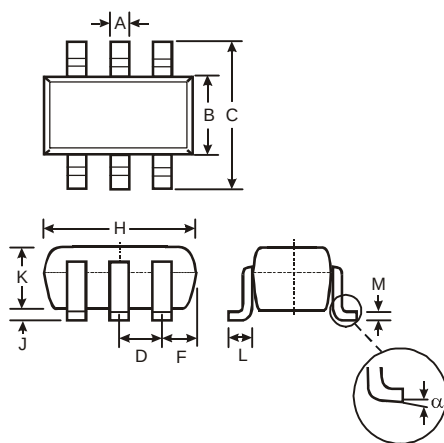
Typical Curves – DCX114TU NPN Section



Typical Curves – DCX114TU NPN Section (cont.)

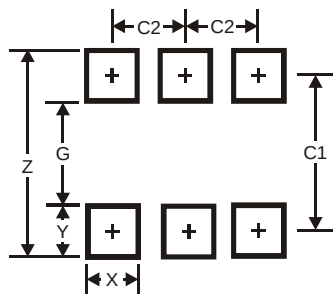


Package Outline Dimensions



SOT363		
Dim	Min	Max
A	0.10	0.30
B	1.15	1.35
C	2.00	2.20
D	0.65 Typ	
F	0.40	0.45
H	1.80	2.20
J	0	0.10
K	0.90	1.00
L	0.25	0.40
M	0.10	0.22
α	0°	8°
All Dimensions in mm		

Suggested Pad Layout



Dimensions	Value (in mm)
Z	2.5
G	1.3
X	0.42
Y	0.6
C1	1.9
C2	0.65

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