DDTCxxxxLP (R1≠R2 Series)

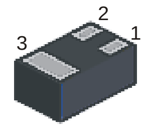
PRE-BIASED SMALL SIGNAL SURFACE MOUNT 100mA NPN TRANSISTOR

Features

- Epitaxial Planar Die Construction
- Ultra-Small Leadless Surface Mount Package
- Ideally Suited for Automated Assembly Processes
- **Lead Free By Design/RoHS Compliant (Note 1)**
- **"Green" Device (Note 2)**

Mechanical Data

- Case: DFN1006-3
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminal Connections: Collector Dot (See Diagram)
- Terminals: Finish — NiPdAu annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Marking Information: See Page 6
- Ordering Information: See Page 6
- Weight: 0.001 grams (approximate)



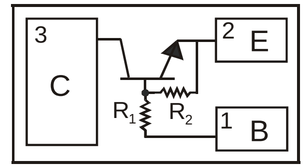
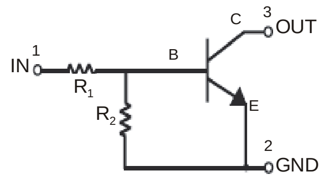
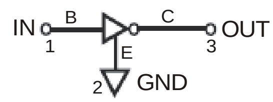


Fig. 1



Schematic and Pin Configuration



Equivalent Inverter Circuit

Fig. 2

Component P/N	R1(NOM)	R2(NOM)	Figure
DDTC123JLP	2.2K	47K	2
DDTC143ZLP	4.7K	47K	2
DDTC114YLP	10K	47K	2

Maximum Ratings @T_A = 25°C unless otherwise specified

Characteristic	P/N	Symbol	Value	Unit
Supply Voltage		V_{CC}	50	V
Input Voltage	DDTC123JLP	V_{IN}	-5 to +12	V
	DDTC143ZLP		-5 to +30	
	DDTC114YLP		-5 to +40	
Output Voltage	DDTC123JLP	I_O	100	mA
	DDTC143ZLP		100	
	DDTC114YLP		70	
Power Dissipation (Note 3)		P_D	250	mW
Power Deration above 25 °C		P_{der}	2	mW/°C
Maximum Collector Current		$I_{C(max)}$	100	mA

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Junction Operating and Storage Temperature Range	T_j, T_{STG}	-55 to +150	°C
Thermal Resistance, Junction to Ambient Air (Note 3) (Equivalent to one heated junction of NPN)	$R_{\theta JA}$	400	°C/W

Notes:
1. No purposefully added lead.
2. Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com/products/lead_free/index.php.
3. Device mounted on FR-4 PCB, 1 inchx0.85inchx0.062inch; pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on page 6 or our website at http://www.diodes.com/datasheets/ap02001.pdf.

Electrical Characteristics @T_A = 25°C unless otherwise specified

Characteristic	P/N	Symbol	Min	Typ	Max	Unit	Test Condition
Off Characteristics (Note 4)							
Collector-Base Breakdown Voltage		$V_{(BR)CBO}$	50	—	—	V	I_C = 10μA, I_E = 0
Collector-Emitter Breakdown Voltage *		$V_{(BR)CEO}$	50	—	—	V	I_C = 2mA, I_B = 0
Emitter-Base Breakdown Voltage *		$V_{(BR)EBO}$	4.5	—	—	V	I_E = 50μA, I_C = 0
Collector Cutoff Current *		I_{CEX}	—	—	0.5	μA	V_{CE} = 50V, $V_{EB(OFF)}$ = 3.0V
Base Cutoff Current (I_{BEX})		I_{BL}	—	—	0.5	μA	V_{CE} = 50V, $V_{EB(OFF)}$ = 3.0V
Collector-Base Cut Off Current		I_{CBO}	—	—	0.5	μA	V_{CB} = 50V, I_E = 0
Collector-Emitter Cut Off Current, $I_{O(OFF)}$		I_{CEO}	—	—	0.5	μA	V_{CE} = 50V, I_B = 0
Emitter-Base Cut Off Current		I_{EBO}	—	—	0.5	mA	V_{EB} = 5V, I_C = 0
Input-Off Voltage		$V_{I(OFF)}$	—	—	0.5	V	V_{CE} = 5V, I_C = 100μA
On Characteristics (Note 4)							
Base-Emitter Turn-On Voltage*	DDTC123JLP	$V_{BE(ON)}$	—	—	0.85	V	V_{CE} = 5V, I_C = 2mA
	DDTC143ZLP		—	—	0.85		
	DDTC114YLP		—	—	0.95		
Base-Emitter Saturation Voltage*	DDTC123JLP	$V_{BE(SAT)}$	—	—	0.98	V	I_C = 10mA, I_B = 1mA, V_{CE}=5V
	DDTC143ZLP		—	—	0.998		
	DDTC114YLP		—	—	0.98		
Input-On Voltage		$V_{I(ON)}$	1.1	—	—	V	V_O = 0.3V, I_C = 5mA
Input Current	DDTC123JLP	I_I	—	—	7.2	mA	V_I = 5V
	DDTC143ZLP		—	—	1.5		
	DDTC114YLP		—	—	7.2		
DC Current Gain		h_{FE}	50	—	—	—	V_{CE} = 5V, I_C = 1mA
			70	—	—	—	V_{CE} = 5V, I_C = 2mA
			125	—	—	—	V_{CE} = 5V, I_C = 5mA
			150	—	—	—	V_{CE} = 5V, I_C = 10mA
			180	—	—	—	V_{CE} = 5V, I_C = 50mA
Collector-Emitter Saturation Voltage		$V_{CE(SAT)}$	—	—	0.15	V	I_C = 10mA, I_B = 1mA
			—	—	0.2	V	I_C = 50mA, I_B = 5mA
Output On Voltage (Same as $V_{CE(SAT)}$)		$V_{O(ON)}$	—	—	0.3		I_J = 2.5mA, I_O = 50mA
Input Resistor +/-30%		ΔR1	-30	—	30	%	—
Resistor Ratio		Δ (R2/R1)	-20	—	-20	%	—
Small Signal Characteristics							
Transition Frequency (gain bandwidth product)		Ft	—	250	—	MHz	V_{CE} = 10V, I_E = 5mA, f = 100MHz

*Guaranteed by design

Notes: 4. Short duration pulse test used to minimize self-heating effect.
Pulse Test: Pulse width, tp<300 uS, Duty Cycle, d<=0.02

Typical Characteristics Curves @T_A = 25°C unless otherwise specified

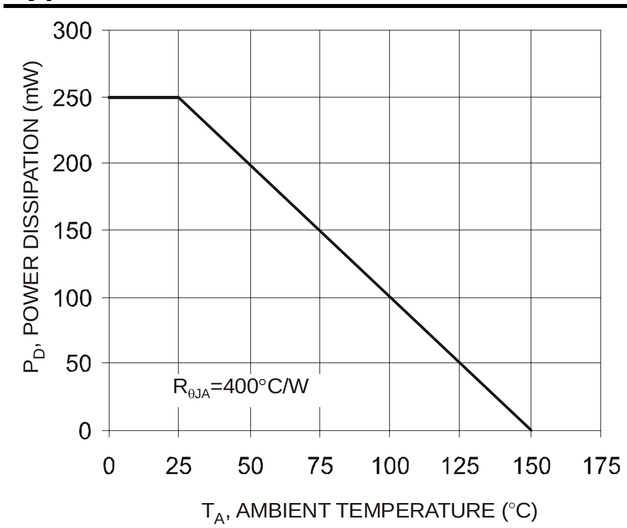


Fig. 3 Power Derating Curve

Characteristics Curves of DDTC123JLP @T_A = 25°C unless otherwise specified

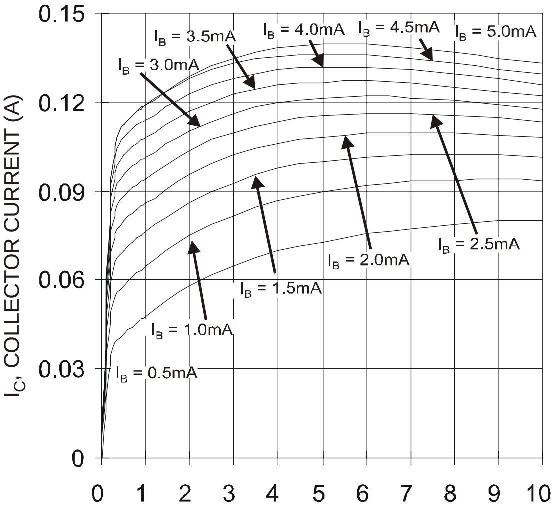


Fig. 4 I_C vs V_{CE}

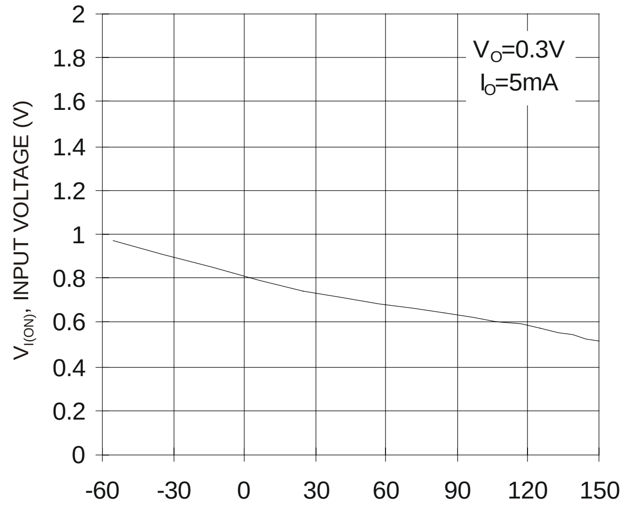


Fig. 5 Input Voltage vs. T_A

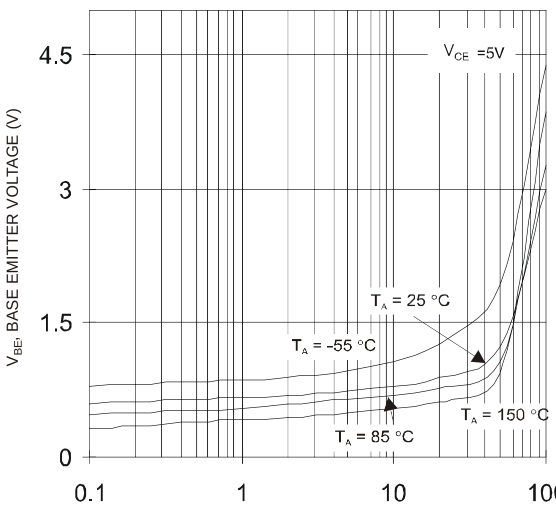


Fig. 6 V_{BE} vs I_C

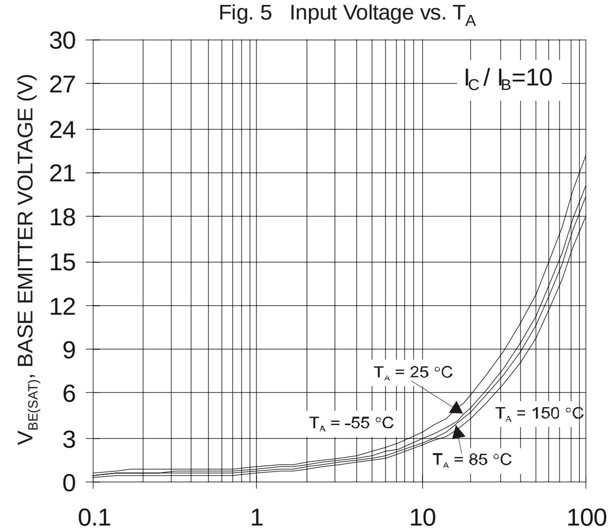


Fig. 7 $V_{BE(SAT)}$ vs. I_C

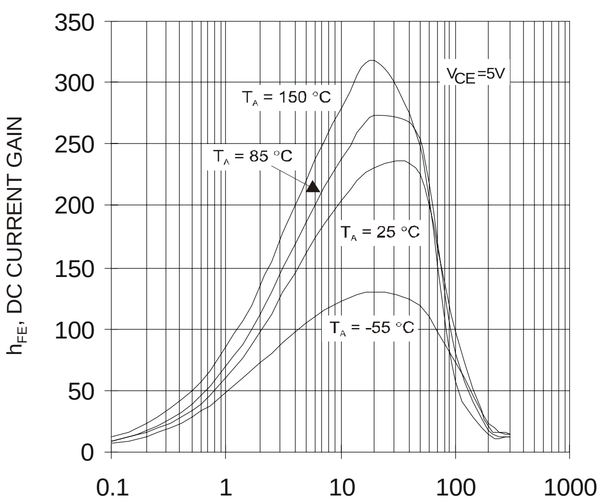


Fig. 8 DC Current Gain

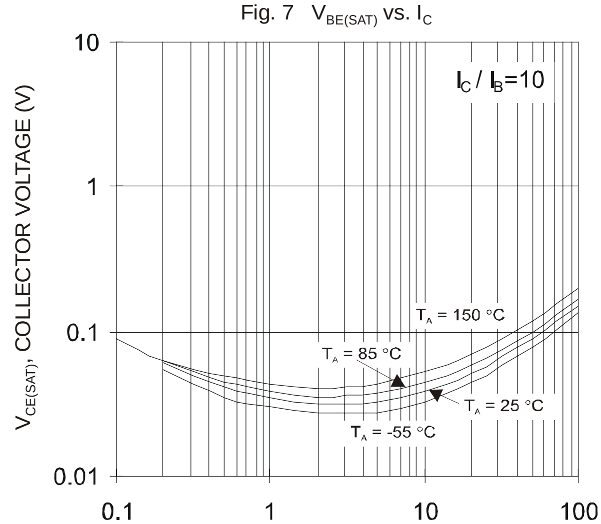


Fig. 9 $V_{CE(SAT)}$ vs. I_C

Characteristics Curves of DDTC143ZLP
@T_A = 25°C unless otherwise specified

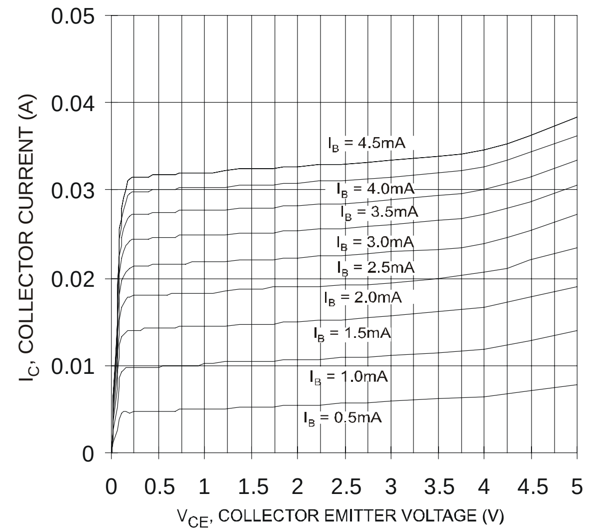


Fig. 10 I_C vs V_{CE}

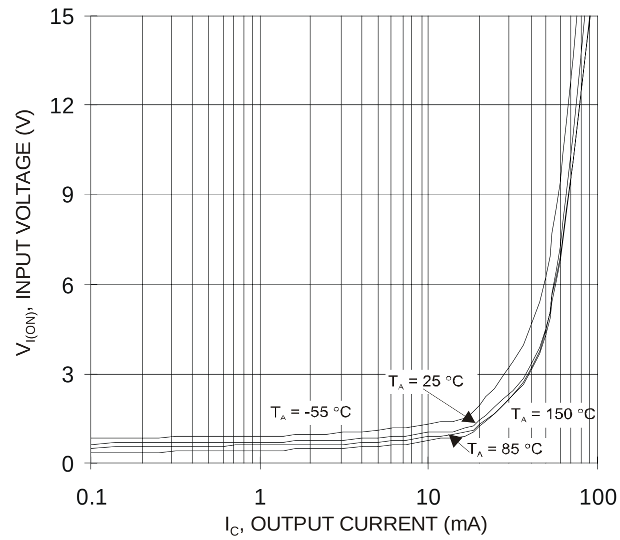


Fig. 11 Input Voltage vs. Output Current

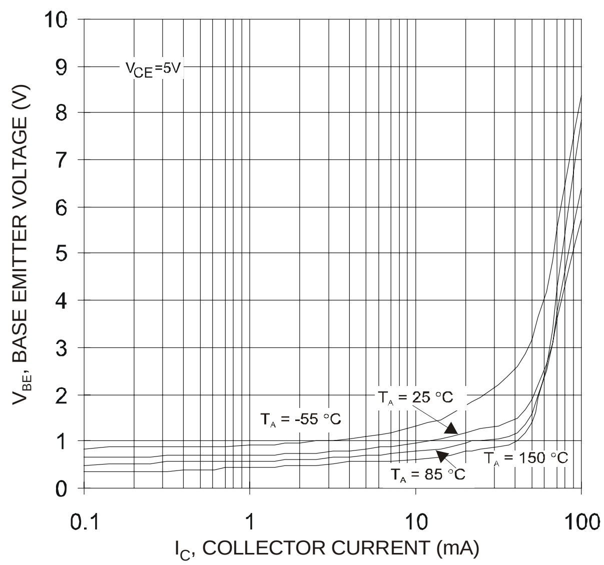


Fig. 12 V_{BE} vs. I_C

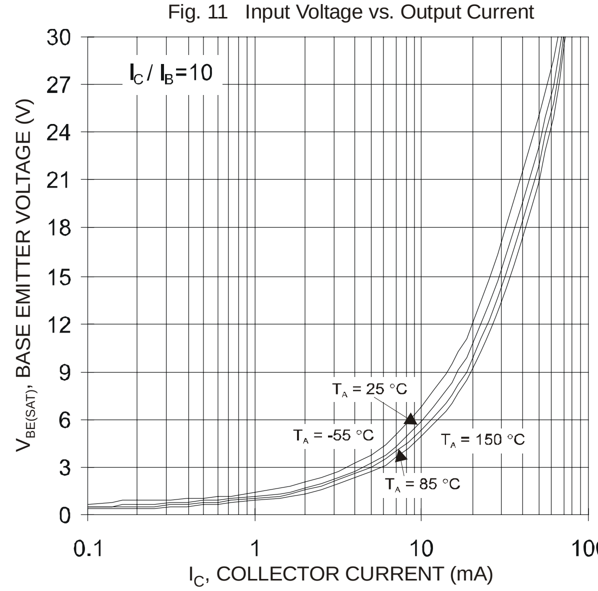


Fig. 13 $V_{BE(SAT)}$ vs. I_C

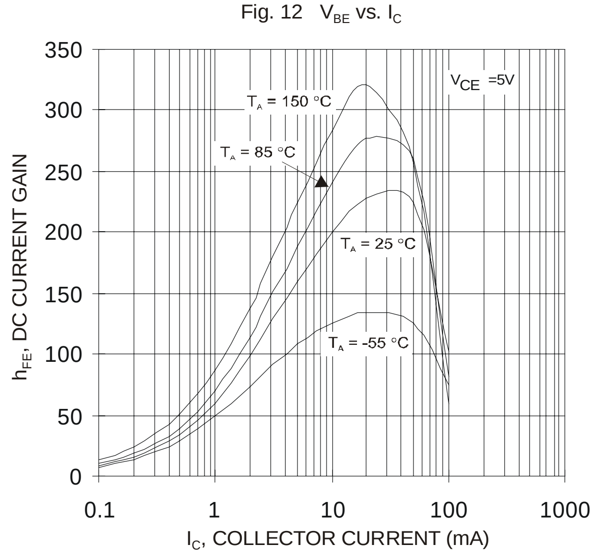


Fig. 14 DC Current Gain

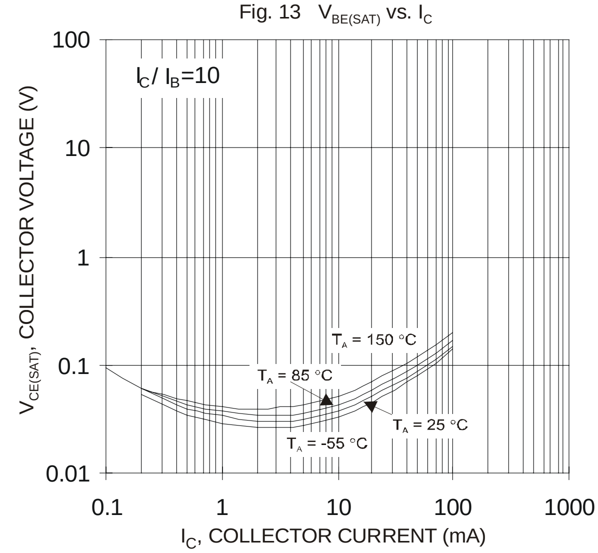


Fig. 15 $V_{CE(SAT)}$ vs. I_C

Characteristics Curves of DDTC114YLP @T_A = 25°C unless otherwise specified

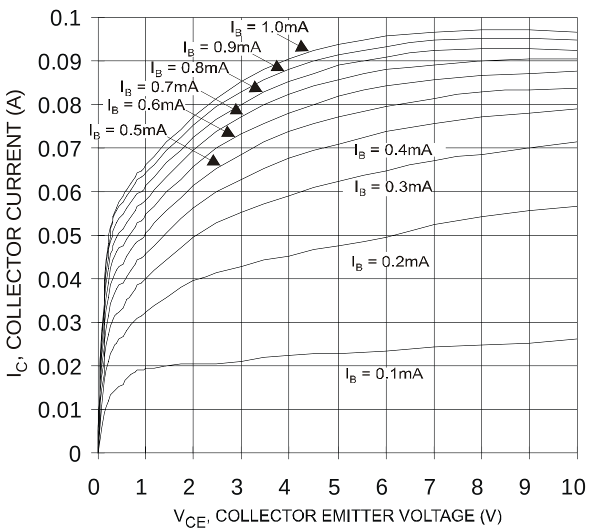


Fig. 16 I_C vs V_{CE}

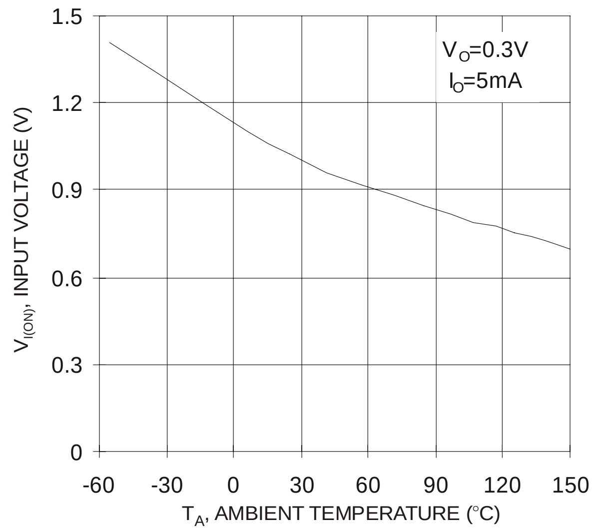


Fig. 17 Input Voltage vs. T_A

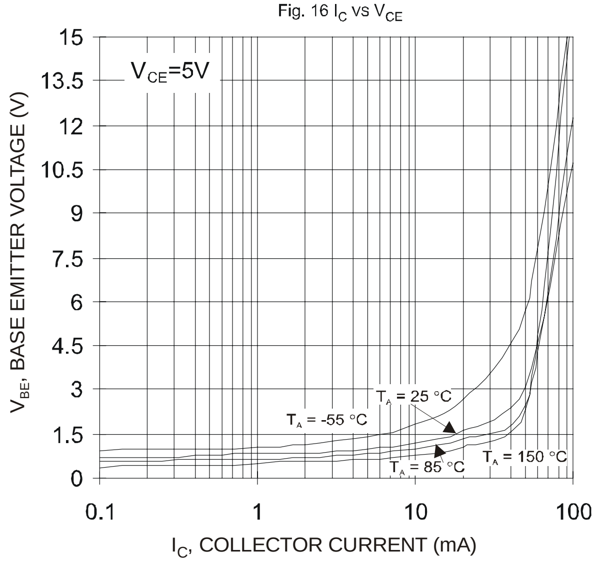


Fig. 18 V_{BE} vs. I_C

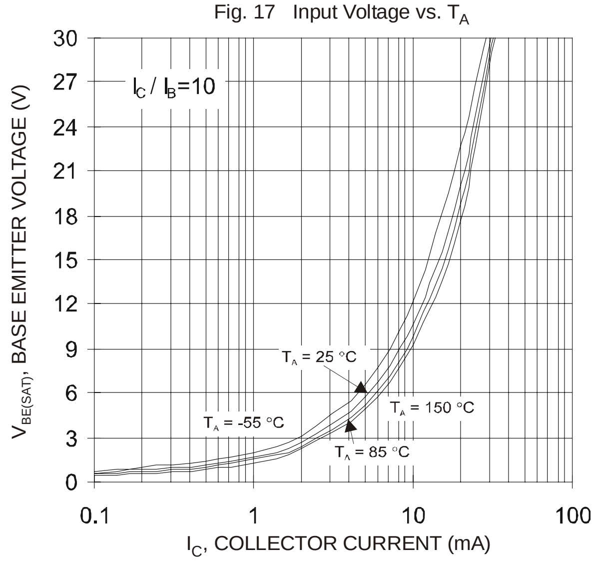


Fig. 19 $V_{BE(SAT)}$ vs. I_C

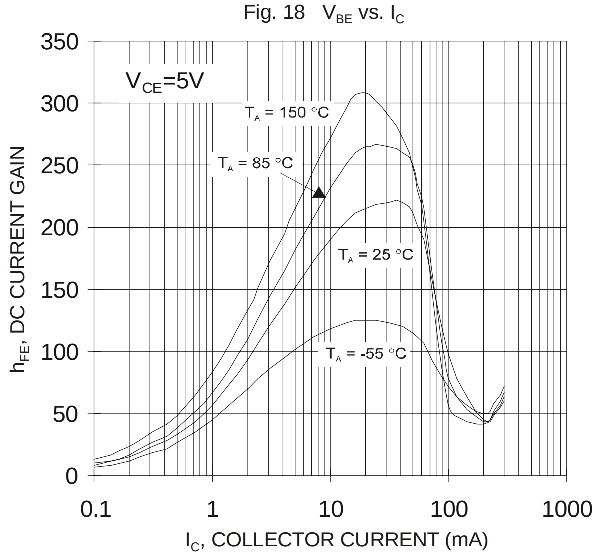


Fig. 20 DC Current Gain

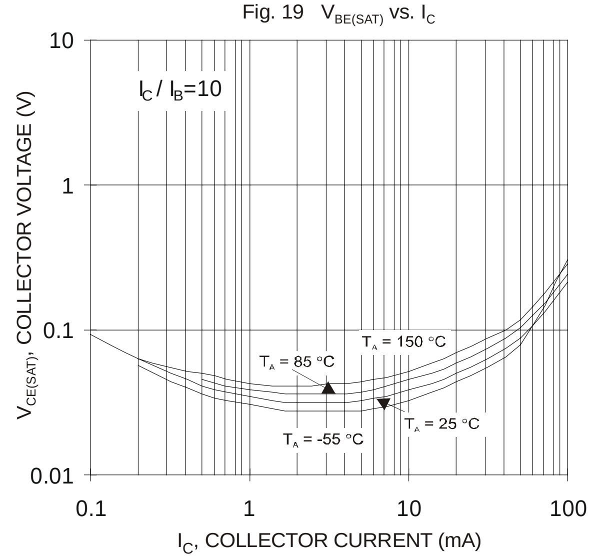


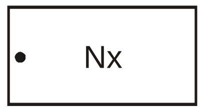
Fig. 21 $V_{CE(SAT)}$ vs. I_C

Ordering Information (Note 5)

Device	Marking Code	Packaging	Shipping
DDTC123JLP-7-F	N0	DFN1006-3	3000/Tape & Reel
DDTC143ZLP-7-F	N1	DFN1006-3	3000/Tape & Reel
DDTC114YLP-7-F	N2	DFN1006-3	3000/Tape & Reel

Notes: 5. For Packaging Details, please see below or go to our website at http://www.diodes.com/datasheets/ap02007.pdf.

Marking Information



Nx = Product Type Marking Code, see ordering information above
YM = Date Code Marking
Y = Year e.g. U = 2007
M = Month e.g. 9 = September

Fig. 22

Date Code Key

Year	2007	2008	2009	2010	2011	2012
Code	U	V	W	X	Y	Z

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

Mechanical Details

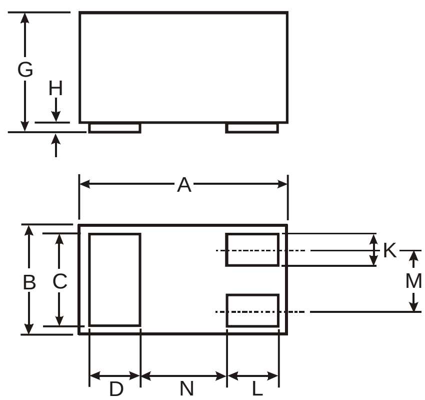
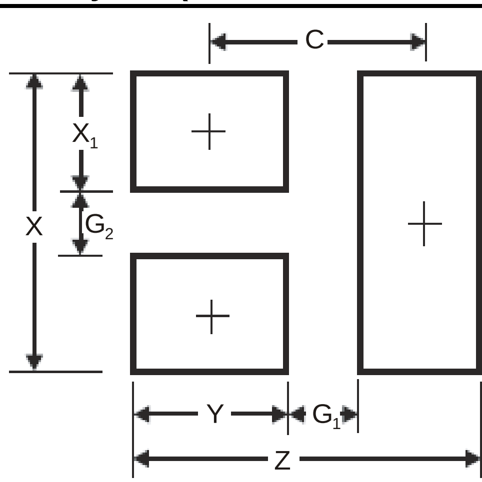


Fig. 23

DFN1006-3			
Dim	Min	Max	Typ
A	0.95	1.075	1.00
B	0.55	0.675	0.60
C	0.45	0.55	0.50
D	0.20	0.30	0.25
G	0.47	0.53	0.50
H	0	0.05	0.03
K	0.10	0.20	0.15
L	0.20	0.30	0.25
M	—	—	0.35
N	—	—	0.40
All Dimensions in mm			

Suggested Pad Layout: (Based on IPC-SM-782)



DFN1006-3	
Z	1.1
G1	0.3
G2	0.2
X	0.7
X1	0.25
Y	0.4
C	0.7
All Dimensions in mm	

Fig. 24

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