DDC144TU

DUAL NPN TRANSISTORS WITH 47K OHM BASE RESISTOR

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General Description

- DDC144TU is best suited for logic switching applications using control circuits like micro-controllers, comparators, etc. It features two discrete NPN transistors which can support maximum continuous current of 100 mA. NPN transistors can be used as a control and also these can be biased using higher supply voltages due to the built in current limiting base resistor of 47 K Ohm. The component devices can be used as a part of a circuit or as a stand alone discrete device.

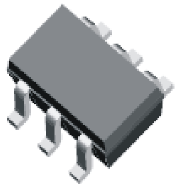


Fig. 1: SOT-363

Features

- Built in Base Resistors
- Epitaxial Planar Die Construction
- **Lead Free By Design/RoHS Compliant (Note 1)**
- **"Green" Device (Note 2)**

Mechanical Data

- Case: SOT-363
- Case Material: Molded Plastic. "Green Molding" Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminal Connections: See Fig. 2
- Terminals: Finish - Matte Tin annealed over Alloy 42 leadframe. Solderable per MIL-STD-202, Method 208
- Marking & Type Code Information: See Page 5
- Ordering Information: See Page 5
- Weight: 0.015 grams (approximate)

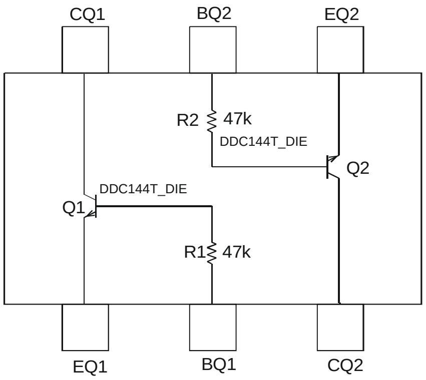


Fig. 2: Schematic and Pin Configuration

Sub-Component P/N	Reference	Device Type	R1 (NOM)	R2 (NOM)	Figure
DDTC144T_DIE	Q1	NPN	47KΩ	—	2
DDTC144T_DIE	Q2	NPN	—	47KΩ	2

Maximum Ratings: Total Device @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Power Dissipation	P_d	200	mW
Power Deration above 25°C	P_{der}	1.6	mW / °C
Output Current	I_{out}	100	mA

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Junction Operation and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C
Thermal Resistance, junction to ambient (packaged device) (Ref: equivalent to only one heated junction) @ T_A = 25°C	$R_{\theta JA}$	625	°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" x 0.85" x 0.062"; pad layout as shown on Page 5 or see Diodes Inc. suggested pad layout document AP02001, which can be found on our website at http:/www.diodes.com/datasheets/ap02001.pdf.

Maximum Ratings:

Sub-Component Device: Discrete NPN Transistor (Q1, Q2) @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	50	V
Collector-Emitter Voltage	V_{CEO}	50	V
Emitter-Base Voltage	V_{EBO}	6	V
Collector Current (dc)	$I_{C(max)}$	50	mA

Electrical Characteristics @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Off Characteristics						
Collector-Base Cut Off Current	I_{CBO}	—	—	100	nA	V_{CB} = 50V, I_E = 0
Collector-Emitter Cut Off Current, $I_{O(OFF)}$	I_{CEO}	—	—	500	nA	V_{CE} = 50V, I_B = 0
Emitter-Base Cut Off Current	I_{EBO}	—	—	500	nA	V_{EB} = 5V, I_C = 0
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	50	—	—	V	I_C = 50uA, I_E = 0
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	50	—	—	V	I_C = 1 mA, I_B = 0
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	6	—	—	V	I_E = 50uA, I_C = 0
Output Voltage (Transistor is off)	V_{OH}	4.6	4.45	—	V	V_{CC} = 5V, V_B = 0.05V, R_L = 1KΩ
Input Voltage (load is off)	$V_{I(OFF)}$	—	0.6	0.4	—	V_{CE} = 5V, I_C = 100uA
Output Current (leakage same as I_{CEO})	$I_{O(OFF)}$	—	—	850	nA	V_{CC} = 50V, V_I = 0V
On Characteristics*						
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	0.03	0.1	V	I_C = 2.5 mA, I_B = 0.25 mA
		—	0.075	0.1	V	I_C = 10mA, I_B = 0.5mA
		—	0.05	0.1	V	I_C = 10mA, I_B = 1mA
		—	0.2	0.3	V	I_C = 50mA, I_B= 5mA
DC Current Gain	h_{FE}	150	400	—	—	V_{CE} = 5V, I_C = 1 mA
		150	400	—	—	V_{CE} = 5V, I_C = 10 mA
		150	350	—	—	V_{CE} = 5V, I_C = 25 mA
		150	300	—	—	V_{CE} = 5V, I_C = 50 mA
		50	110	—	—	V_{CE} = 5V, I_C = 100 mA
Output Voltage (equivalent to $V_{CE(SAT)}$ or $V_{O(on)}$)	V_{OL}	—	0.2	0.25	Vdc	V_{CC} = 5V, V_B = 2.5V, R_L=10KΩ
Input Voltage	$V_{I(ON)}$	1.5	0.95	—	Vdc	V_O= 0.3V, I_C= 2mA
Input Current	I_i	—	19.2	28	mA	V_I = 5V
Base-Emitter Turn-on Voltage	$V_{BE(ON)}$	—	—	1.2	V	V_{CE} = 5V, I_C = 2mA
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	—	—	1.6	V	I_C = 200uA, I_B = 20uA
Input Resistor +/- 30% (Base)	R1	—	47	—	KΩ	—
Small Signal Characteristics						
Transition Frequency (gain-bandwidth product)	f_T	—	250	—	MHz	V_{CE} = 10V, I_E = 5mA, f =100MHz
Collector Capacitance, (Ccbo-Output Capacitance)	C_C	—	—	5	pF	V_{CB} = 10V, I_E = 0, f = 1MHz

*Pulse Test: Pulse width, tp<300 uS, Duty Cycle, d<=0.02

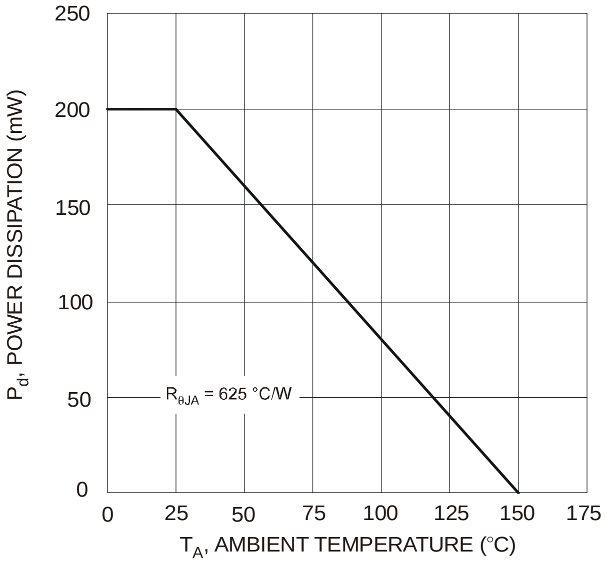


Fig. 3 Maximum Power Derating Curve

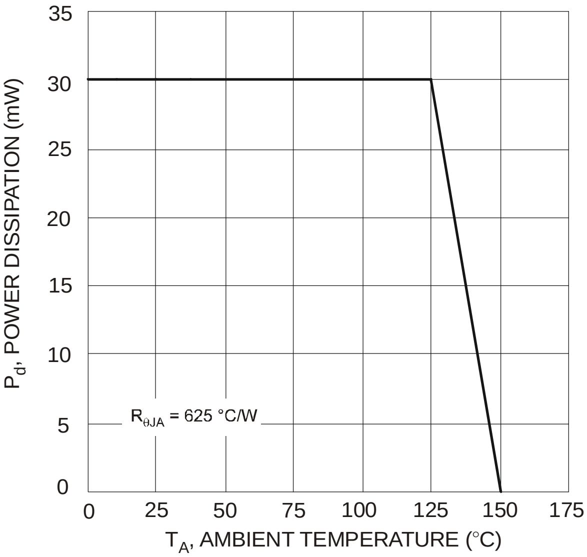


Fig. 4 Power Derating for Nominal Operation

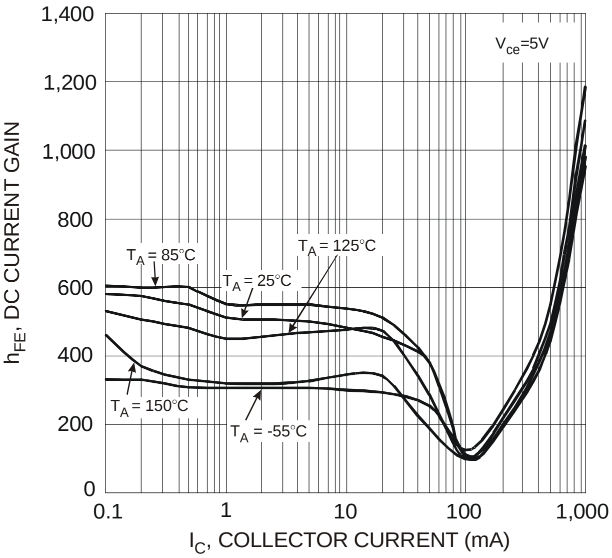


Fig. 5 DC Current Gain

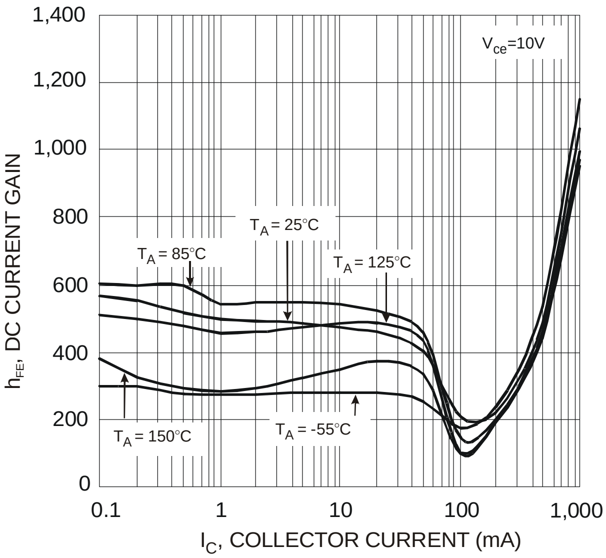


Fig. 6 DC Current Gain

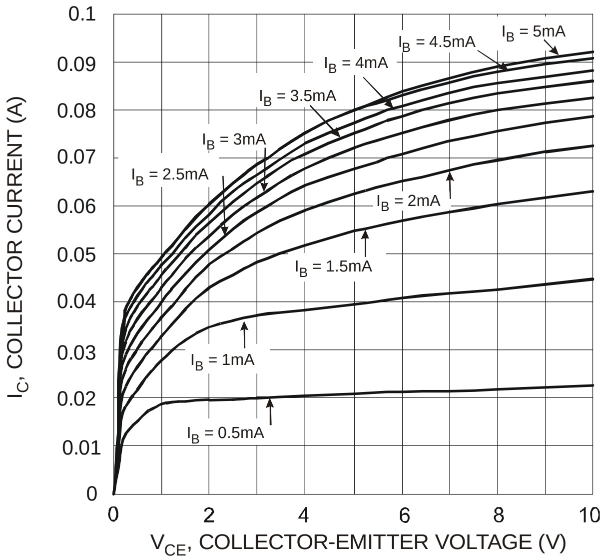


Fig. 7 I_C vs. V_{CE}

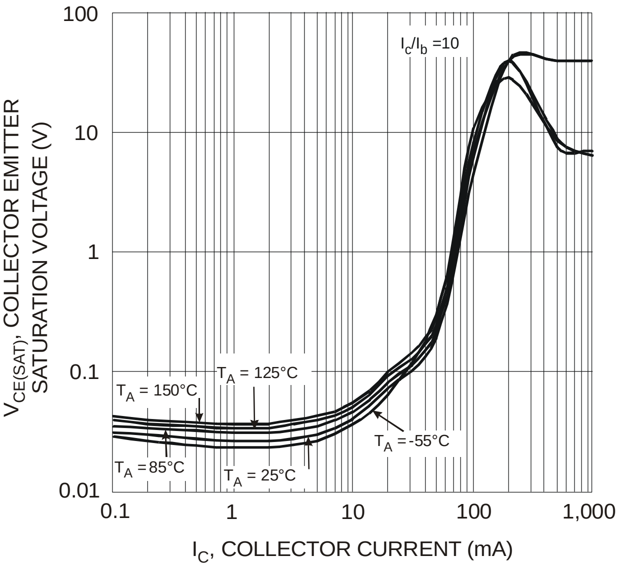


Fig. 8 $V_{CE(SAT)}$ vs I_C

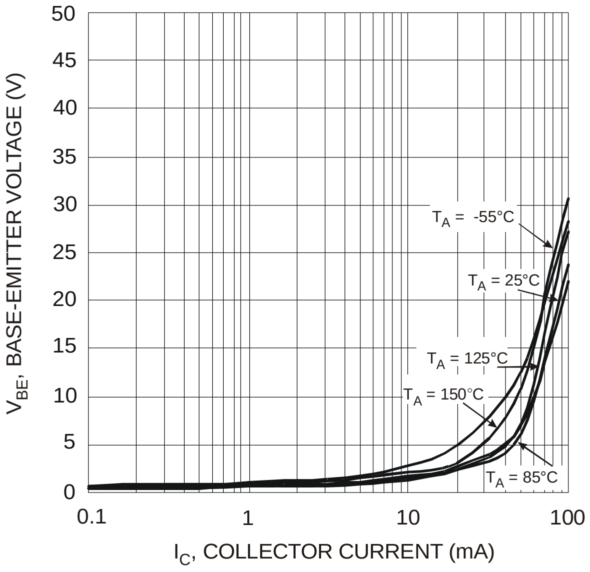


Fig. 9 V_{BE} vs I_C

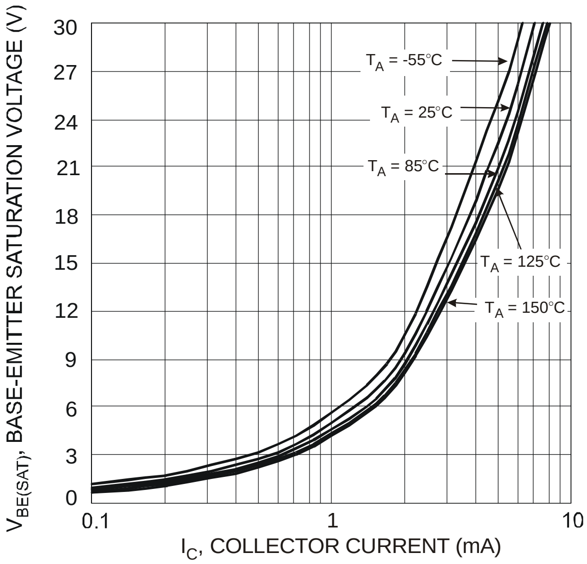


Fig. 10 $V_{BE(SAT)}$ vs I_C

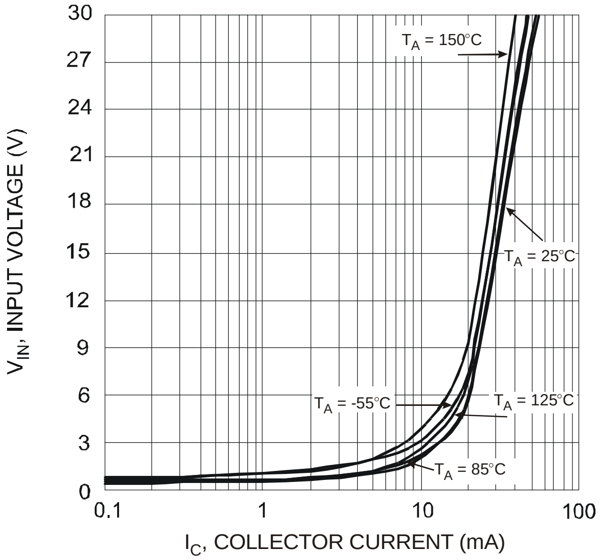


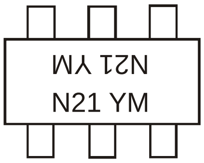
Fig. 11 Input Voltage vs Output Current

Ordering Information (Note 4)

Device	Marking Code	Packaging	Shipping
DDC144TU-7	N21	SOT-363	3000/Tape & Reel

Notes: 4. For packaging details, please see below or go to our website at http://www.diodes.com/datasheets/ap02007.pdf.

Marking Information



N21 = Product Type Marking Code
YM = Date Code Marking
Y = Year e.g., U = 2007
M = Month e.g., 9 = September

Fig. 12

Date Code Key

Year	2006	2007	2008	2009	2010	2011	2012
Code	T	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

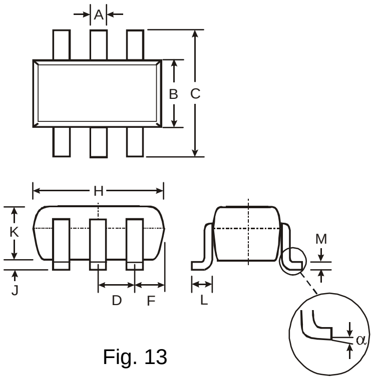


Fig. 13

SOT-363		
Dim	**Min**	**Max**
A	0.10	0.30
B	1.15	1.35
C	2.00	2.20
D	0.65 Nominal	
F	0.30	0.40
H	1.80	2.20
J	–	0.10
K	0.90	1.00
L	0.25	0.40
M	0.10	0.25
α	0°	8°
All Dimensions in mm		

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

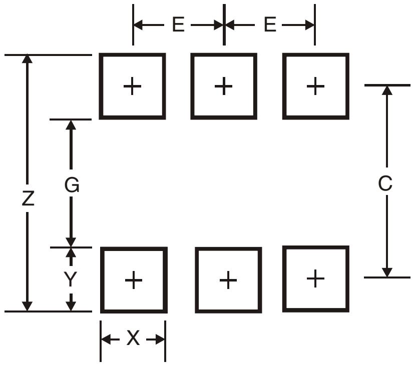


Fig. 14

Figure 14 Dimensions	SOT-363
Z	2.5
G	1.3
X	0.42
Y	0.6
C	1.9
E	0.65
All Dimensions in mm	

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