

HIGH GAIN, LOW $V_{CE(SAT)}$ NPN BIPOLAR TRANSISTOR

Features

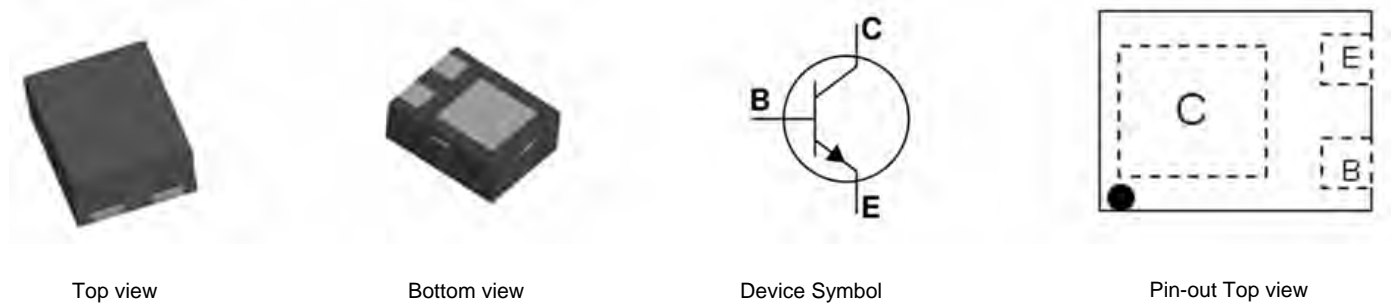
- High Gain Low V_{cesat} NPN transistor
- Very Low R_{cesat}
- High ICM capability
- 1.5A Continuous Current Rating
- Ultra-Small Surface mount Package
- **Qualified to AEC-Q101 Standards for High Reliability**
- **Lead, Halogen and Antimony Free, RoHS Compliant (Note 1)**
- **“Green” Device (Note 2)**
- **ESD rating: 400V-MM, 8KV-HBM**

Mechanical Data

- Case: DFN1411-3
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu over Copper lead frame. Solderable per MIL-STD-202, Method 208
- Weight: 0.003 grams (approximate)

Applications

- MOSFET and IGBT gate driving
- DC-DC conversion
- Interface between low voltage IC and Load
- LED driving

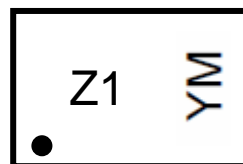


Ordering Information

Product	Status	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTN26020DMFTA	Active	Z1	7	8	3000

Notes: 1. No purposefully added lead. Halogen and Antimony Free.
2. Diodes Inc's "Green" Policy can be found on our website at <http://www.diodes.com>

Marking Information



Z1 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: W = 2009)
M = Month (ex: 9 = September)

Date Code Key

Year	2009	2010	2011	2012	2013	2014	2015
Code	W	X	Y	Z	A	B	C

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	20	V
Collector-Emitter Voltage	V_{CEO}	20	V
Emitter-Base Voltage	V_{EBO}	7	V
Continuous Collector Current (Note 4)	I_C	1.5	A
Peak Pulse Current	I_{CM}	4	A
Base Current	I_B	0.5	A

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 3)	P_D	1	W
Power Dissipation (Note 4)	P_D	380	mW
Thermal Resistance, Junction to Ambient (Note 3) @ $T_A = 25^\circ\text{C}$	$R_{\theta JA}$	125	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient (Note 3) @ $T_A = 25^\circ\text{C}$	$R_{\theta JA}$	330	$^\circ\text{C/W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Notes: 3. Device mounted on FR-4 PCB with 1inch square pads.
4. Device mounted on FR-4 PCB with minimum recommended pad layout

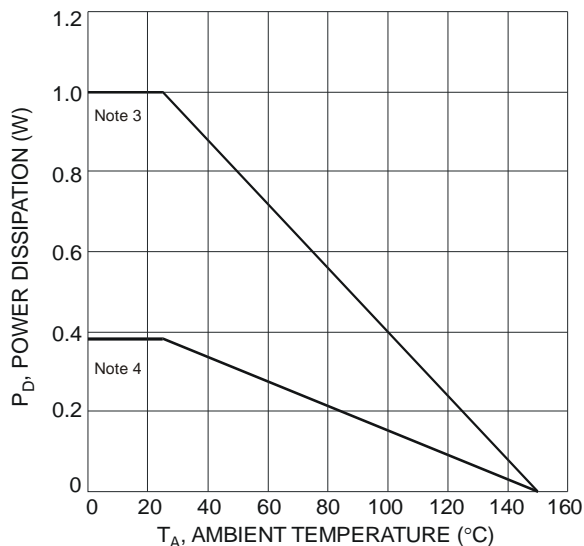


Fig. 1 Power Dissipation vs. Ambient Temperature

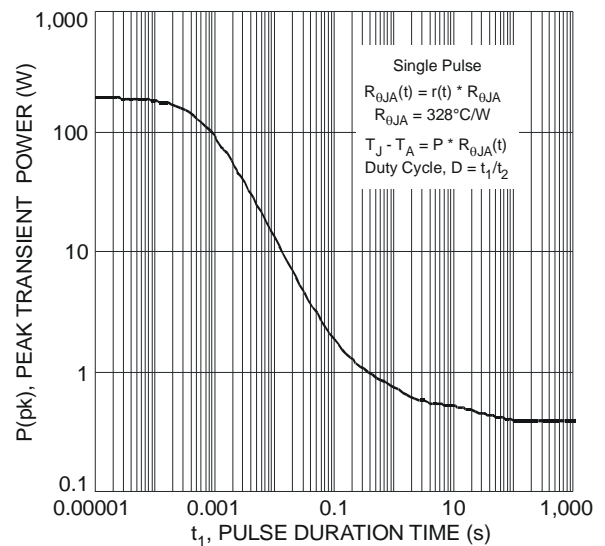


Fig. 2 Single Pulse Maximum Power Dissipation

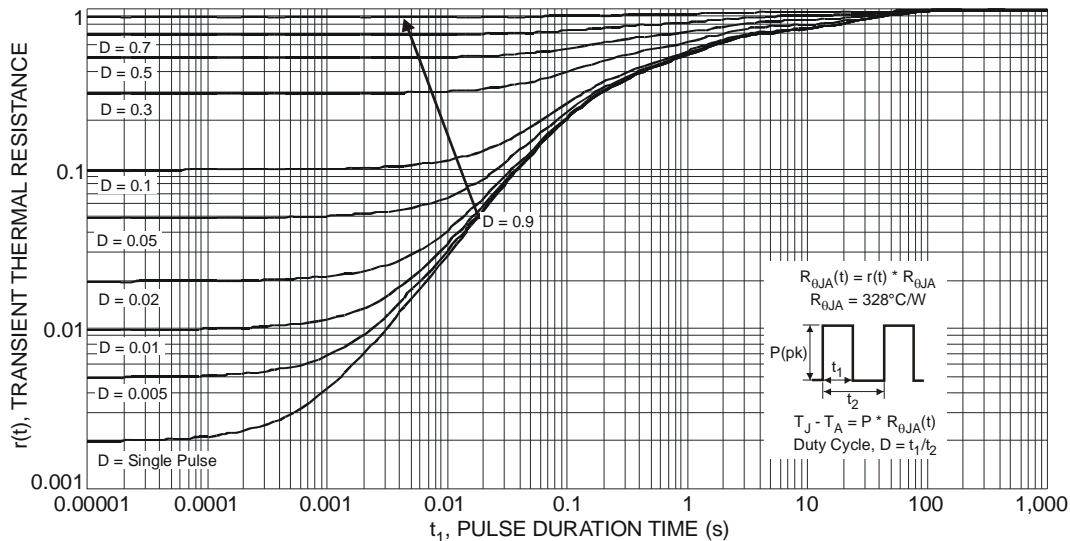


Fig. 3 Transient Thermal Response

Electrical Characteristics (at $T_A = 25^\circ\text{C}$ unless otherwise specified)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	20	—	—	V	$I_C = 100\mu\text{A}, I_E = 0\text{A}$
Collector-Emitter Breakdown Voltage (Note 5)	$V_{(BR)CEO}$	20	—	—	V	$I_C = 10\text{mA}, I_B = 0\text{A}$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	7	—	—	V	$I_E = 100\mu\text{A}, I_C = 0\text{A}$
Emitter-Collector Breakdown Voltage	$V_{(BR)ECO}$	5	—	—	V	$I_E = 100\mu\text{A}, I_B = 0\text{A}$
Collector Cutoff Current	I_{cbo}	—	—	100 0.5	nA μA	$V_{CB} = 20\text{V}, I_E = 0\text{A}$ $V_{CB} = 20\text{V}, I_E = 0, T_A = 125^\circ\text{C}$
Emitter Cutoff Current	I_{ces}	—	—	100	nA	$V_{CE} = 20\text{V}, V_{BE} = 0\text{V}$
Base Cutoff Current	I_{ebo}	—	—	100	nA	$V_{BE} = 5.6\text{V}, I_C = 0\text{A}$
DC Current Gain (Note 5)	h_{FE}	300	—	1000	—	$V_{CE} = 2\text{V}, I_C = 100\text{mA}$
		290	—	—		$V_{CE} = 2\text{V}, I_C = 0.5\text{A}$
		270	—	—		$V_{CE} = 2\text{V}, I_C = 1\text{A}$
		200	—	—		$V_{CE} = 2\text{V}, I_C = 2\text{A}$
Collector-Emitter Saturation Voltage (Note 5)	$V_{CE(SAT)}$	—	—	45	mV	$I_C = 100\text{mA}, I_B = 1\text{mA}$
		—	—	70	mV	$I_C = 500\text{mA}, I_B = 25\text{mA}$
		—	—	125	mV	$I_C = 1\text{A}, I_B = 50\text{mA}$
		—	—	225	mV	$I_C = 1.5\text{A}, I_B = 30\text{mA}$
		—	—	225	mV	$I_C = 2\text{A}, I_B = 100\text{mA}$
Equivalent On-Resistance	$R_{CE(SAT)}$	—	90	—	m Ω	$I_C = 1\text{A}, I_B = 50\text{mA}$
Base-Emitter Turn-On Voltage	$V_{BE(ON)}$	—	—	1.2	V	$V_{CE} = 2\text{V}, I_C = 2\text{A}$
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	—	—	1.1	V	$I_C = 2\text{A}, I_B = 100\text{mA}$
Output Capacitance (Note 5)	C_{obo}	—	—	20	pF	$V_{CB} = 10\text{V}, f = 1.0\text{MHz}$
Input Capacitance (Note 5)	C_{ibo}	—	—	150	pF	$V_{EB} = 0.5\text{V}, f = 1.0\text{MHz}$
Current Gain-Bandwidth Product	f_T	—	260	—	MHz	$V_{CE} = 10\text{V}, I_C = 50\text{mA}, f = 100\text{MHz}$
Turn-On Time	t_{on}	—	60	—	ns	$V_{CC} = 10\text{V}, I_C = 1\text{A}$ $I_{B2} = -I_{B1} = 50\text{mA}$
Delay Time	t_d	—	20	—	ns	
Rise Time	t_r	—	40	—	ns	
Turn-Off Time	t_{off}	—	225	—	ns	
Storage Time	t_s	—	205	—	ns	
Fall Time	t_f	—	20	—	ns	

Notes: 5. Short duration pulse test used to minimize self-heating effect.

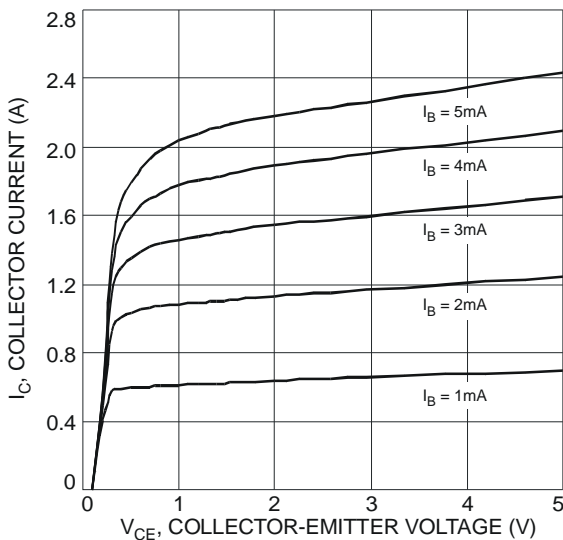


Fig. 4 Typical Collector Current vs. Collector-Emitter Voltage

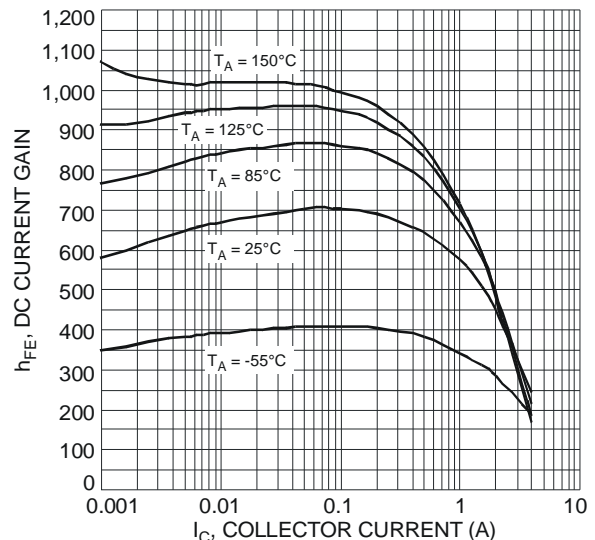


Fig. 5 Typical DC Current Gain vs. Collector Current

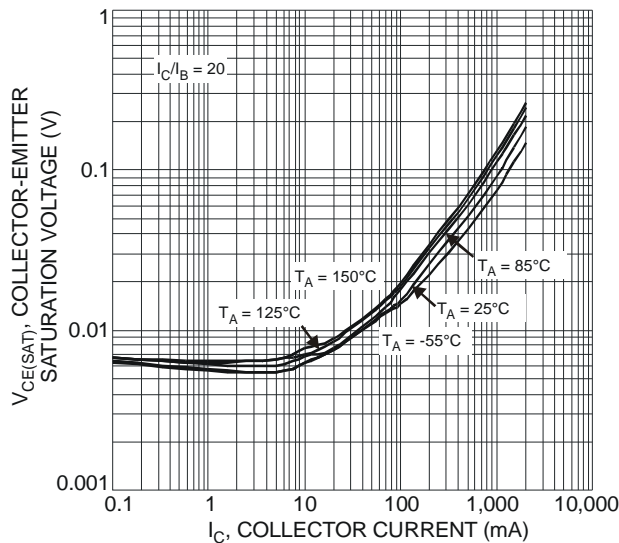


Fig. 6 Typical Collector-Emitter Saturation Voltage vs. Collector Current

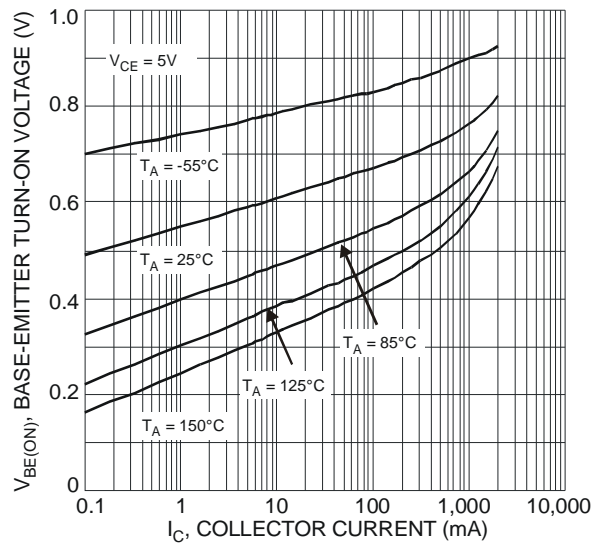


Fig. 7 Typical Base-Emitter Turn-On Voltage vs. Collector Current

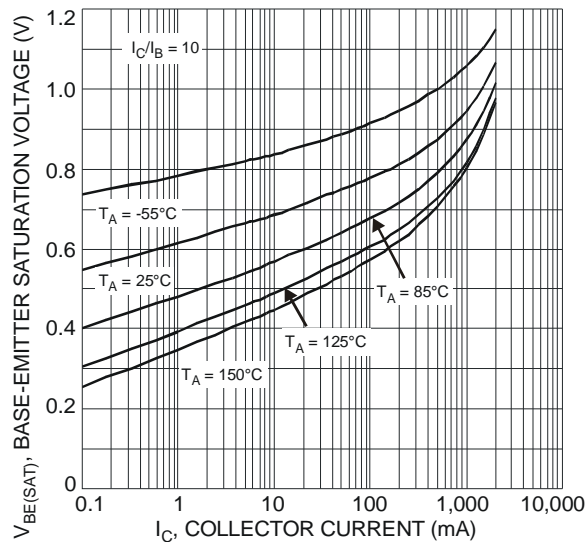


Fig. 8 Typical Base-Emitter Saturation Voltage vs. Collector Current

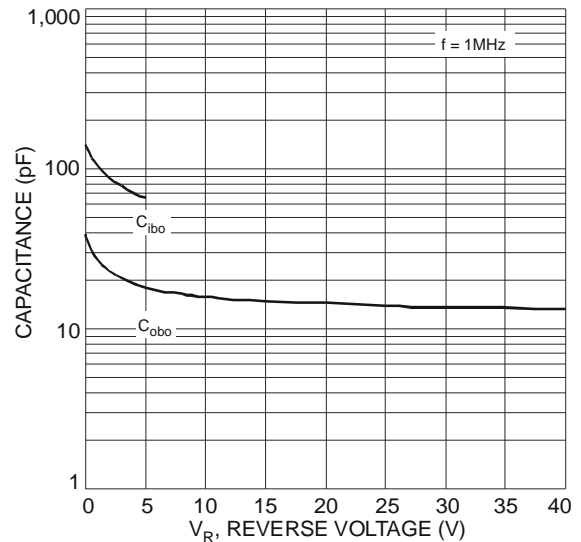


Fig. 9 Typical Capacitance Characteristics

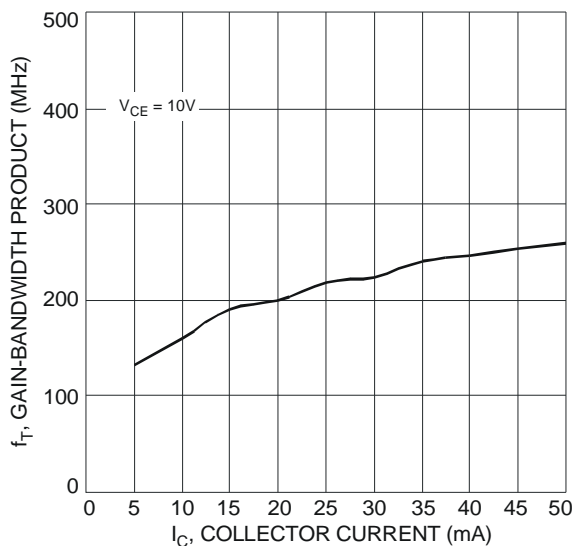


Fig. 10 Typical Gain-Bandwidth Product vs. Collector Current

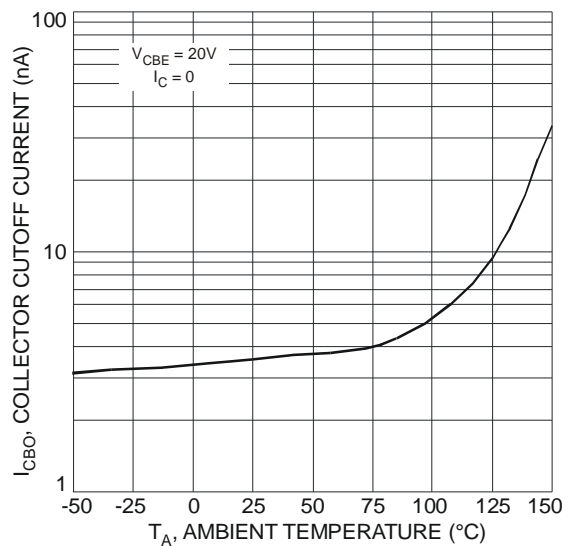
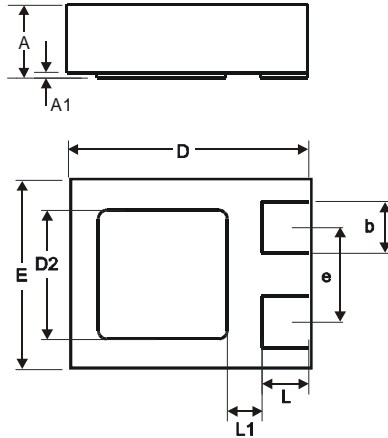


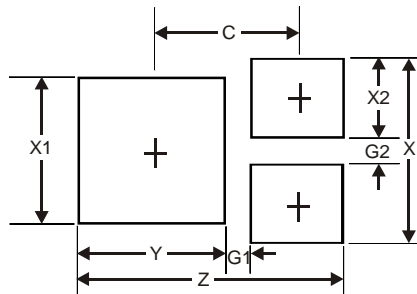
Fig. 11 Collector Cutoff Current vs. Ambient Temperature

Package Outline Dimensions



DFN1411-3			
Dim	Min	Max	Typ
A	0.47	0.53	0.50
A1	0	0.05	0.02
b	0.25	0.35	0.30
D	1.35	1.475	1.40
D2	0.65	0.85	0.75
E	1.05	1.18	1.10
e	—	—	0.55
L	0.225	0.325	0.275
L1	—	—	0.20
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
Z	1.38
G1	0.15
G2	0.15
X	0.95
X1	0.75
X2	0.40
Y	0.75
C	0.76

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