

**20V NPN LOW SATURATION TRANSISTOR AND
40V, 1A SCHOTTKY DIODE COMBINATION DUAL**

Features

- PNP Transistor
 - $V_{CE0} = 20V$
 - $R_{SAT} = 47m\Omega$
 - $I_C = 4.5A$
- Schottky Diode
 - $V_R = 40V$
 - $V_F = 500mv$ (@1A)
 - $I_C = 1A$
- $I_C = 4.5A$ Continuous Collector Current
- Low Saturation Voltage (150mV @ 1A)
- h_{FE} characterized up to 6A
- Low V_F , fast switching Schottky
- **Lead, Halogen, and Antimony Free/RoHS Compliant (Note 1)**
- **"Green" Devices (Note 2)**

Mechanical Data

- Case: DFN3020B-8
- Terminals: Pre-Plated NiPdAu leadframe
- Nominal package height: 0.8mm
- UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Solderable per MIL-STD-202, Method 208
- Weight: 0.013 grams (approximate)

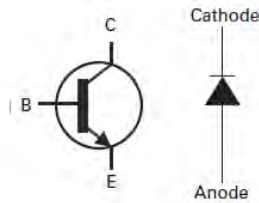
Applications

- DC – DC Converters
- Charging circuits
- Mobile phones
- Motor control

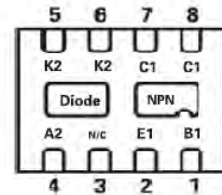
DFN3020B-8



Top View



Device symbol



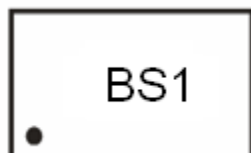
Pin Configuration

Ordering Information

Product	Status	Package	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTNS618MCTA	Active	DFN3020B-8	BS1	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 <https://www.diodes.com>

Marking Information



BS1 = Product type Marking Code
Dot Denotes Pin 1

Maximum Ratings, Transistor

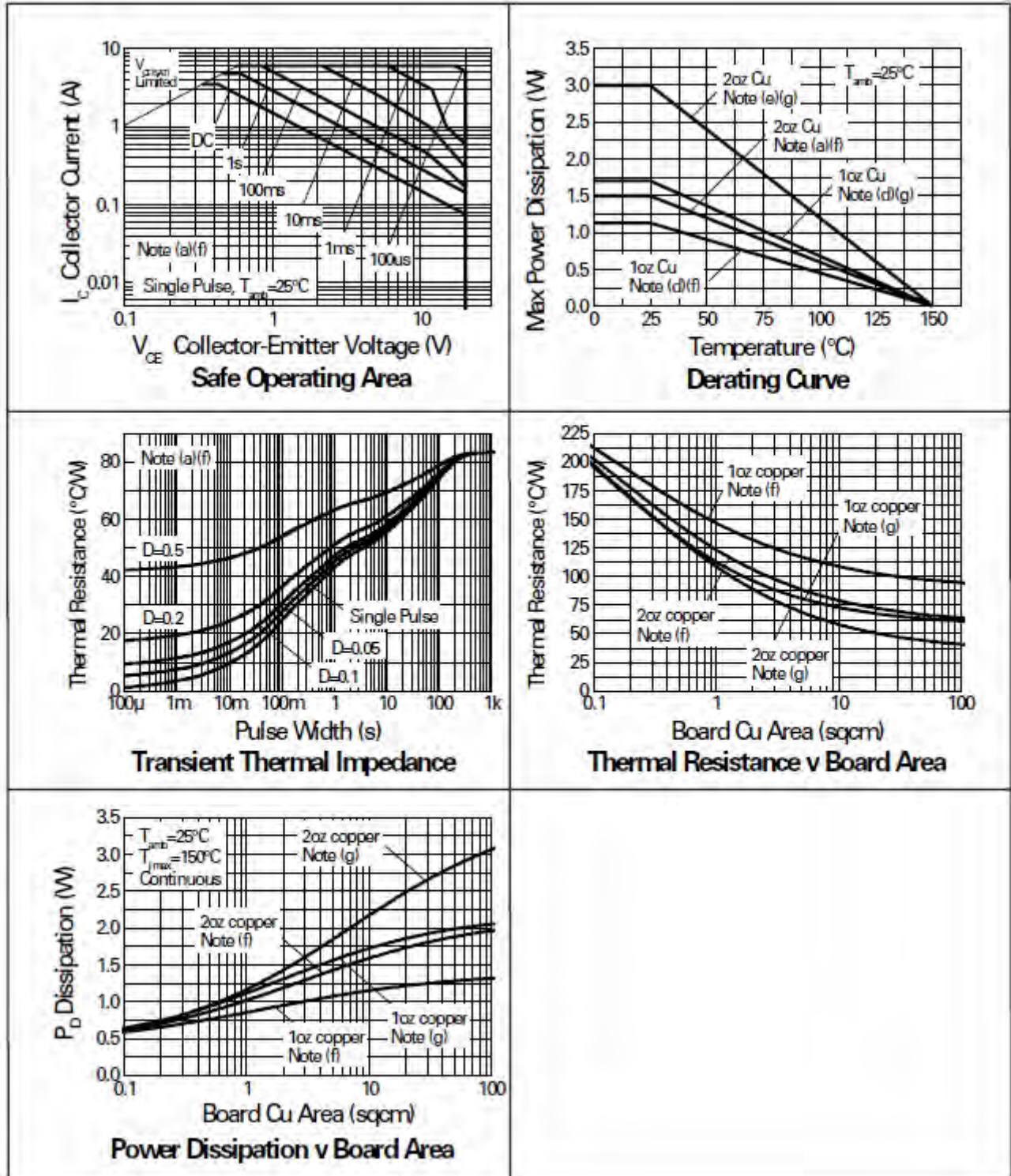
Parameter	Symbol	Limit	Unit
Collector-Base Voltage	V_{CBO}	40	V
Collector-Emitter Voltage	V_{CEO}	20	V
Emitter-Base Voltage	V_{EBO}	7.5	V
Peak Pulse Current	I_{CM}	12	A
Continuous Collector Current (Notes a and f)	I_C	4.5	A
Continuous Collector Current (Notes b and f)	I_C	5	A
Base Current	I_B	1	A

Thermal Characteristics, Transistor

Characteristic	Symbol	Value	Unit
Power Dissipation at $T_A = 25^\circ\text{C}$ (Notes a and f) Linear Derating Factor	P_D	1.5 12	W mW/ $^\circ\text{C}$
Power Dissipation at $T_A = 25^\circ\text{C}$ (Notes b and f) Linear Derating Factor	P_D	2.45 19.6	W mW/ $^\circ\text{C}$
Power Dissipation at $T_A = 25^\circ\text{C}$ (Notes c and f) Linear Derating Factor	P_D	1 8	W mW/ $^\circ\text{C}$
Power Dissipation at $T_A = 25^\circ\text{C}$ (Notes d and f) Linear Derating Factor	P_D	1.13 9	W mW/ $^\circ\text{C}$
Power Dissipation at $T_A = 25^\circ\text{C}$ (Notes d and g) Linear Derating Factor	P_D	1.7 13.6	W mW/ $^\circ\text{C}$
Power Dissipation at $T_A = 25^\circ\text{C}$ (Notes e and g) Linear Derating Factor	P_D	3 24	W mW/ $^\circ\text{C}$
Junction to Ambient (Notes a and f)	$R_{\theta JA}$	83	$^\circ\text{C}/\text{W}$
Junction to Ambient (Notes b and f)	$R_{\theta JA}$	51	$^\circ\text{C}/\text{W}$
Junction to Ambient (Notes c and f)	$R_{\theta JA}$	125	$^\circ\text{C}/\text{W}$
Junction to Ambient (Notes d and f)	$R_{\theta JA}$	111	$^\circ\text{C}/\text{W}$
Junction to Ambient (Notes d and g)	$R_{\theta JA}$	73.5	$^\circ\text{C}/\text{W}$
Junction to Ambient (Notes e and g)	$R_{\theta JA}$	41.7	$^\circ\text{C}/\text{W}$
Junction Temperature	T_J	150	$^\circ\text{C}$
Operating and Storage Temperature Range	T_{STG}	-55 to +150	$^\circ\text{C}$

- Notes:
- For a dual device surface mounted on 8 sq cm single sided 2 oz copper on FR4 PCB, in still air conditions **with all exposed pads attached**. The copper area is split down the centre line into two separate areas with one half connected to each half of the dual device.
 - Measured at $t < 5$ secs for a dual device surface mounted on 8 sq cm single sided 2 oz copper on FR4 PCB, in still air conditions **with all exposed pads attached**. The copper area is split down the centre line into two separate areas with one half connected to each half of the dual device.
 - For a dual device surface mounted on 8 sq cm single sided 2 oz copper on FR4 PCB, in still air conditions **with minimal lead connections only**.
 - For a dual device surface mounted on 10 sq cm single sided 1 oz copper on FR4 PCB, in still air conditions **with all exposed pads attached**. The copper area is split down the centre line into two separate areas with one half connected to each half of the dual device.
 - For a dual device surface mounted on 85 sq cm single sided 2 oz copper on FR4 PCB, in still air conditions **with all exposed pads attached**. The copper area is split down the centre line into two separate areas with one half connected to each half of the dual device.
 - For a dual device with one active die.
 - For dual device with 2 active die running at equal power.

Thermal Characteristics and Derating information, Transistor



Maximum Ratings, Schottky Diode

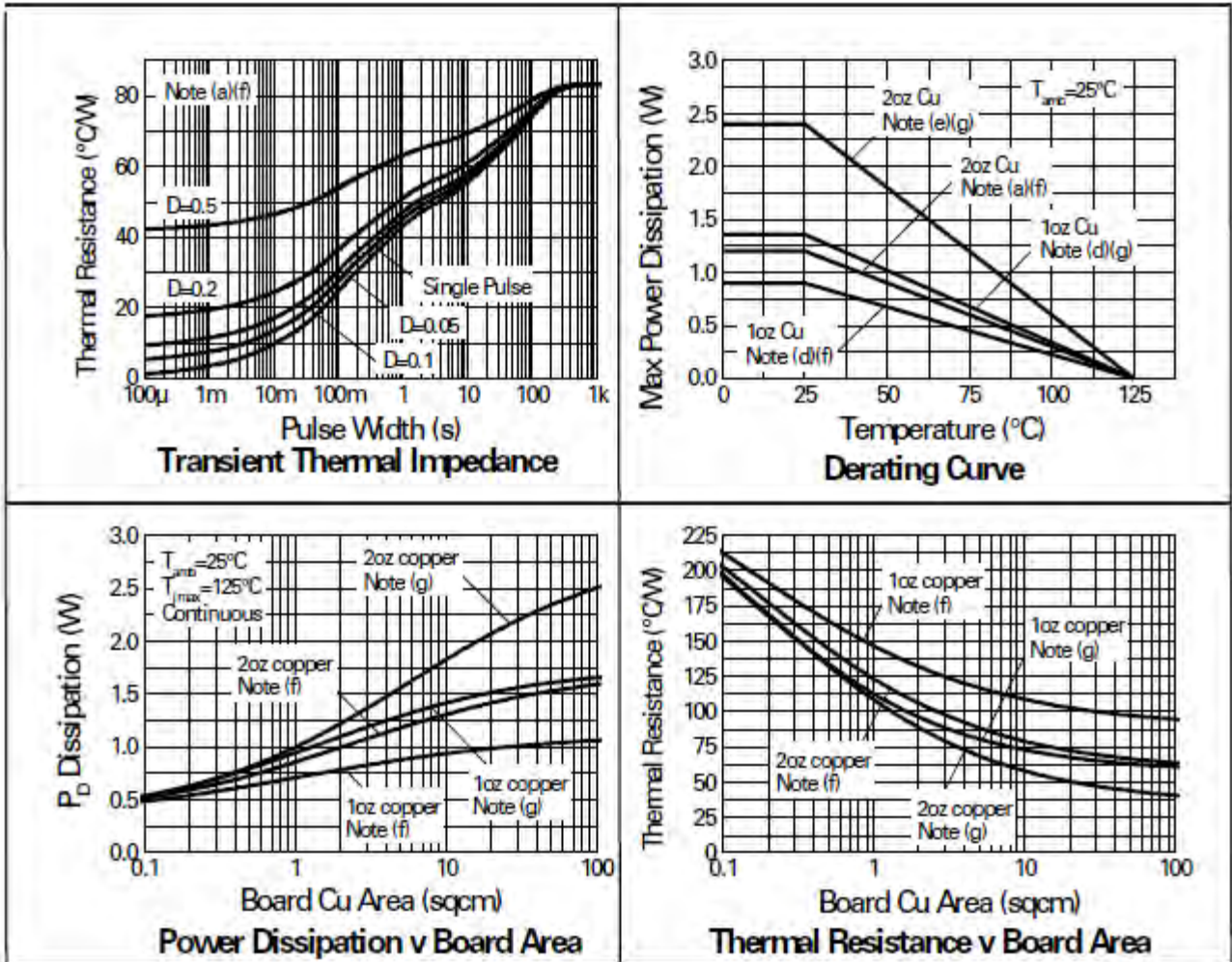
Parameter	Symbol	Limit	Unit
Continuous Reverse Voltage	V_R	40	V
Forward Voltage @ $I_F = 1000\text{mA}$ (typ)	V_F	425	mV
Forward Current	I_F	1850	mA
Average Peak Forward Current $D=50\%$	I_{FAV}	3	A
Non Repetitive Forward Current $t \leq 100\mu\text{s}$ $t \leq 10\text{ms}$	I_{FSM}	12 7	A A

Thermal Characteristics, Schottky Diode

Characteristic	Symbol	Value	Unit
Power Dissipation at $T_A = 25^\circ\text{C}$ (Note a and f) Linear Derating Factor	P_D	1.2 12	W mW/ $^\circ\text{C}$
Power Dissipation at $T_A = 25^\circ\text{C}$ (Note b and f) Linear Derating Factor	P_D	2 20	W mW/ $^\circ\text{C}$
Power Dissipation at $T_A = 25^\circ\text{C}$ (Note c and f) Linear Derating Factor	P_D	0.8 8	W mW/ $^\circ\text{C}$
Power Dissipation at $T_A = 25^\circ\text{C}$ (Note d and f) Linear Derating Factor	P_D	0.9 9	W mW/ $^\circ\text{C}$
Power Dissipation at $T_A = 25^\circ\text{C}$ (Note d and g) Linear Derating Factor	P_D	1..36 13.6	W mW/ $^\circ\text{C}$
Power Dissipation at $T_A = 25^\circ\text{C}$ (Note e and g) Linear Derating Factor	P_D	2.4 24	W mW/ $^\circ\text{C}$
Junction to Ambient (Note a and f)	$R_{\theta JA}$	83	$^\circ\text{C}/\text{W}$
Junction to Ambient (Note b and f)	$R_{\theta JA}$	51	$^\circ\text{C}/\text{W}$
Junction to Ambient (Note c and f)	$R_{\theta JA}$	125	$^\circ\text{C}/\text{W}$
Junction to Ambient (Note d and f)	$R_{\theta JA}$	111	$^\circ\text{C}/\text{W}$
Junction to Ambient (Note d and g)	$R_{\theta JA}$	73.5	$^\circ\text{C}/\text{W}$
Junction to Ambient (Note e and g)	$R_{\theta JA}$	41.7	$^\circ\text{C}/\text{W}$
Junction Temperature	T_J	125	$^\circ\text{C}$
Operating and Storage Temperature Range	T_{STG}	-55 to +150	$^\circ\text{C}$

- Notes:
- For a dual device surface mounted on 8 sq cm single sided 2 oz copper on FR4 PCB, in still air conditions **with all exposed pads attached**. The copper area is split down the centre line into two separate areas with one half connected to each half of the dual device.
 - Measured at $t < 5$ secs for a dual device surface mounted on 8 sq cm single sided 2 oz copper on FR4 PCB, in still air conditions **with all exposed pads attached**. The copper area is split down the centre line into two separate areas with one half connected to each half of the dual device.
 - For a dual device surface mounted on 8 sq cm single sided 2 oz copper on FR4 PCB, in still air conditions **with minimal lead connections only**.
 - For a dual device surface mounted on 10 sq cm single sided 1 oz copper on FR4 PCB, in still air conditions **with all exposed pads attached**. The copper area is split down the centre line into two separate areas with one half connected to each half of the dual device.
 - For a dual device surface mounted on 85 sq cm single sided 2 oz copper on FR4 PCB, in still air conditions **with all exposed pads attached**. The copper area is split down the centre line into two separate areas with one half connected to each half of the dual device.
 - For a dual device with one active die.
 - For dual device with 2 active die running at equal power.

Thermal Characteristics and Derating information, Schottky Diode



Electrical Characteristics, Transistor @T_A = 25°C unless otherwise specified

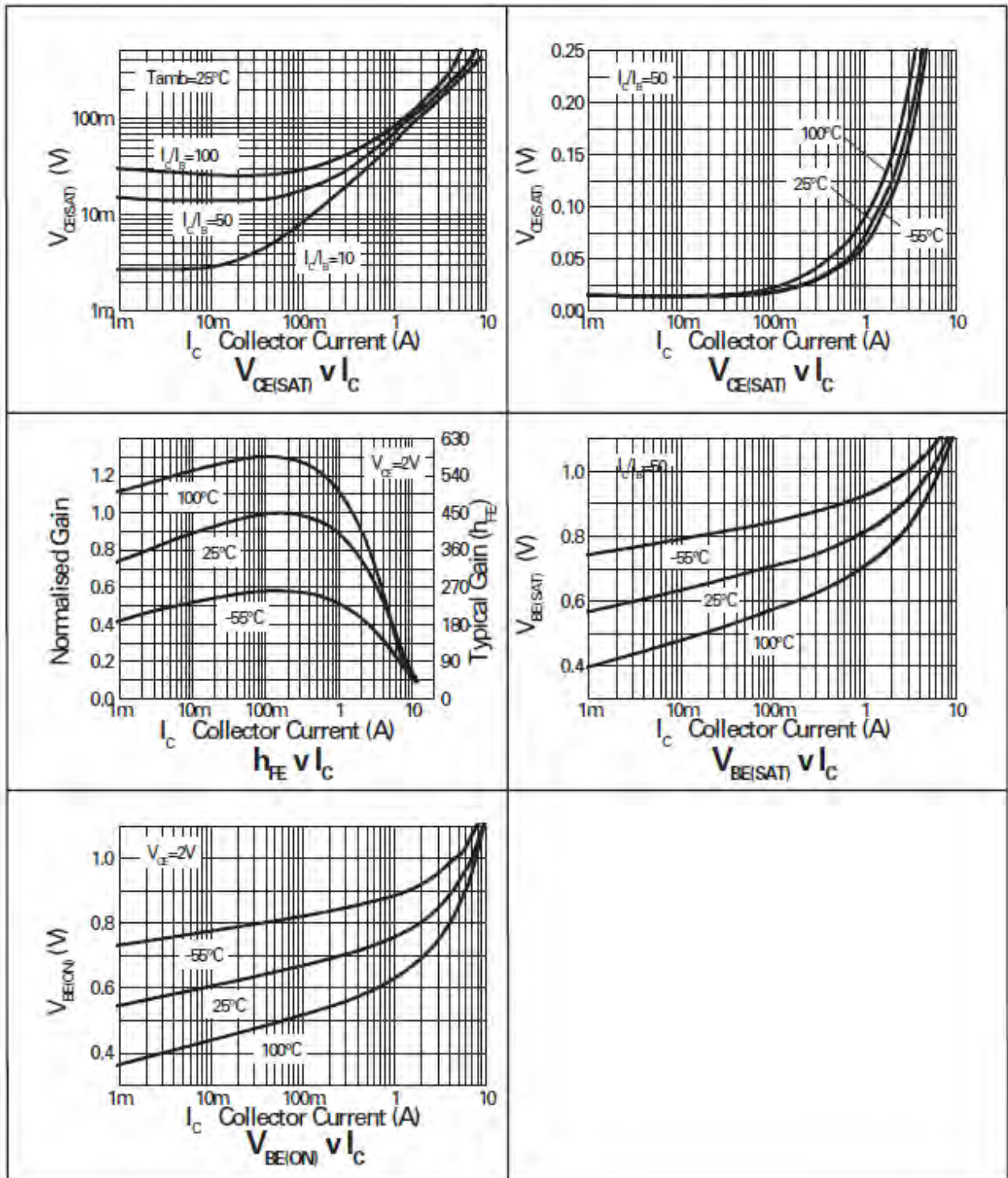
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	V _{(BR)CBO}	40	100	-	V	I _C = 100μA
Collector-Emitter Breakdown Voltage (Note 3)	V _{(BR)CEO}	20	27	-	V	I _C = 10mA
Emitter-Base Breakdown Voltage	V _{(BR)EBO}	7.5	8.2	-	V	I _E = 100μA
Collector Cutoff Current	I _{CBO}	-	-	25	nA	V _{CB} = 32V
Emitter Cutoff Current	I _{EBO}	-	-	25	nA	V _{EB} = 6V
Collector Emitter Cutoff Current	I _{CES}	-	-	25	nA	V _{CES} = 16V
Static Forward Current Transfer Ratio (Note 3)	h _{FE}	200 300 200 100	400 450 360 180	- - - -	-	I _C = 10mA, V _{CE} = 2V I _C = 200mA, V _{CE} = 2V I _C = 2A, V _{CE} = 2V I _C = 6A, V _{CE} = 2V
Collector-Emitter Saturation Voltage (Note 3)	V _{CE(sat)}	- - - - -	8 90 115 190 210	15 150 135 250 270	mV	I _C = 0.1A, I _B = 10mA I _C = 1A, I _B = 10mA I _C = 2A, I _B = 50mA I _C = 3A, I _B = 100mA I _C = 4.5A, I _B = 125mA
Base-Emitter Turn-On Voltage (Note 3)	V _{BE(on)}	-	0.88	-0.95	V	I _C = 4.5A, V _{CE} = 2V
Base-Emitter Saturation Voltage (Note 3)	V _{BE(sat)}	-	0.98	-1.05	V	I _C = 4.5A, I _B = -125mA
Output Capacitance	C _{obo}	-	23	30	pF	V _{CB} = 10V, f = 1MHz
Transition Frequency	f _T	100	140	-	MHz	V _{CE} = 10V, I _C = 50mA, f = 100MHz
Turn-on Time	t _{on}	-	170	-	ns	V _{CC} = 10V, I _C = 3A
Turn-off Time	t _{off}	-	400	-	ns	I _{B1} = I _{B2} = 10mA

Electrical Characteristics, Schottky Diode @T_A = 25°C unless otherwise specified

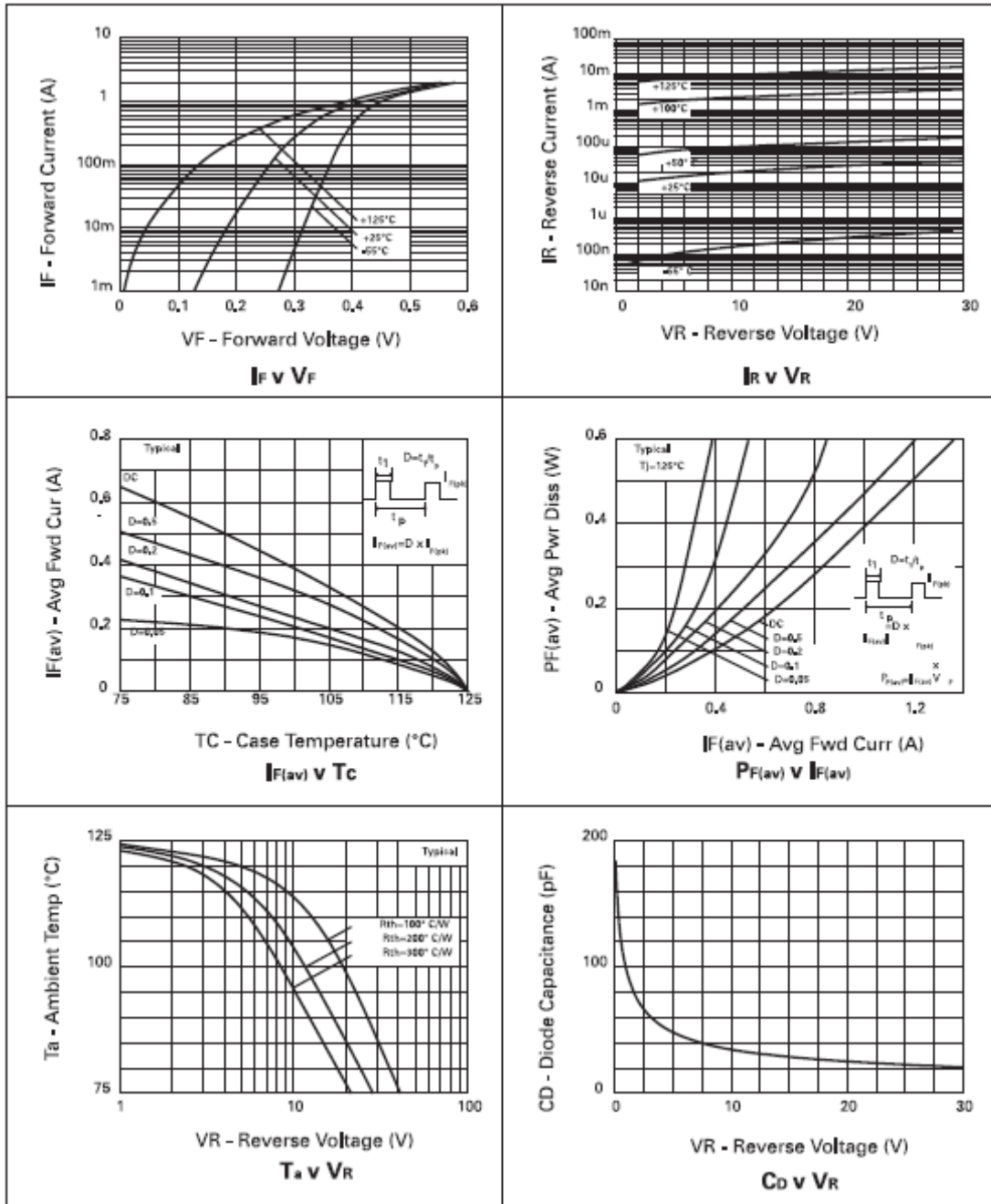
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Breakdown Voltage	V _{(BR)R}	40	60	-	V	I _R = -300μA
Forward Voltage (Note 3)	V _F	- - - - - - - -	240 265 305 355 390 425 495 420	270 290 340 400 450 500 600 -	mV	I _F = 50mA I _F = 100mA I _F = 250mA I _F = 500mA I _F = 750mA I _F = 1000mA I _F = 1500mA I _F = 1000mA, T _A = 100°C
Reverse Current	I _R	-	50	100	μA	V _R = 30V
Diode Capacitance	C _D	-	25	-	pF	V _R = 25V, f = 1MHz
Reverse Recovery Time	t _{rr}	-	12	-	ns	switched from I _F = 500mA to I _R = 500mA Measured at I _R = 50mA

Notes: 3. Measured under pulsed conditions.

Typical Characteristics, Transistor

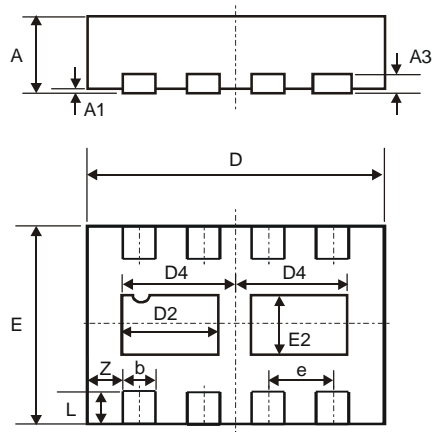


Typical Characteristics, Schottky Diode



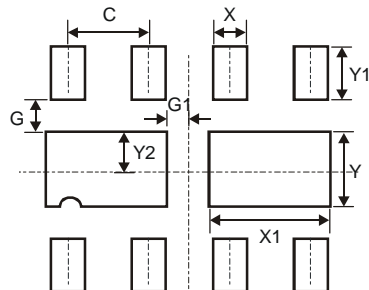
ZXTNS618MC

Package Outline Dimensions



DFN3020B-8			
Dim	Min	Max	Typ
A	0.77	0.83	0.80
A1	0	0.05	0.02
A3	-	-	0.15
b	0.25	0.35	0.30
D	2.95	3.075	3.00
D2	0.82	1.02	0.92
D4	1.01	1.21	1.11
e	-	-	0.65
E	1.95	2.075	2.00
E2	0.43	0.63	0.53
L	0.25	0.35	0.30
Z	-	-	0.375
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
C	0.650
G	0.285
G1	0.090
X	0.400
X1	1.120
Y	0.730
Y1	0.500
Y2	0.365

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