A Product Line of
Diodes Incorporated

ZXTPS717MC

12V PNP LOW SATURATION TRANSISTOR AND 40V, 1A SCHOTTKY DIODE COMBINATION

Features and Benefits

PNP Transistor

- $BV_{CEO} > -12V$
- $I_C = -4A$ Continuous Collector Current
- Low Saturation Voltage (-140mV max @ -1A)
- $R_{SAT} = 65m\Omega$ for a low equivalent On-Resistance
- h_{FE} characterized up to -10A for high current gain hold up

Schottky Diode

- $BV_R > 40V$
- $I_{FAV} = 3A$ Average Peak Forward Current
- Low $V_F < 500mV$ (@1A) for reduced power loss
- Fast switching due to Schottky barrier

- Low profile 0.8mm high package for thin applications
- $R_{\theta JA}$ efficient, 40% lower than SOT26
- $6mm^2$ footprint, 50% smaller than TSOP6 and SOT26
- **Lead-Free, RoHS Compliant (Note 1)**
- **Halogen and Antimony Free. "Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

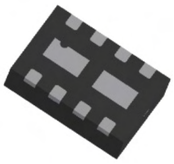
- Case: DFN3020B-8
- Case Material: Molded Plastic, "Green" Molding Component
- Terminals: Pre-Plated NiPdAu leadframe
- Nominal package height: 0.8mm
- UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Weight: 0.013 grams (approximate)

Applications

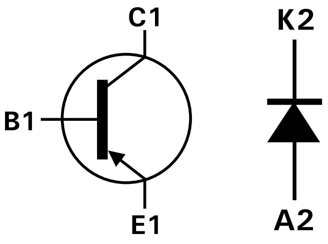
- DC – DC Converters
- Charging circuits
- Mobile phones
- Motor control
- Portable applications

DFN3020B-8

Top View

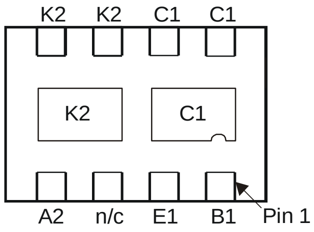


Bottom View



PNP Transistor Schottky Diode

Equivalent Circuit



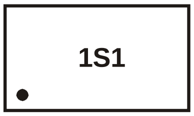
Bottom View
Pin-Out
n/c = Not Connected internally

Ordering Information (Note 3)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
ZXTPS717MCTA	1S1	7	8	3000

Notes: 1. No purposefully added lead.
2. Diodes Inc's "Green" Policy can be found on our website http://www.diodes.com
3. For packaging details, go to our website http://www.diodes.com

Marking Information



1S1 = Product type marking code
Top view, dot denotes pin 1

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

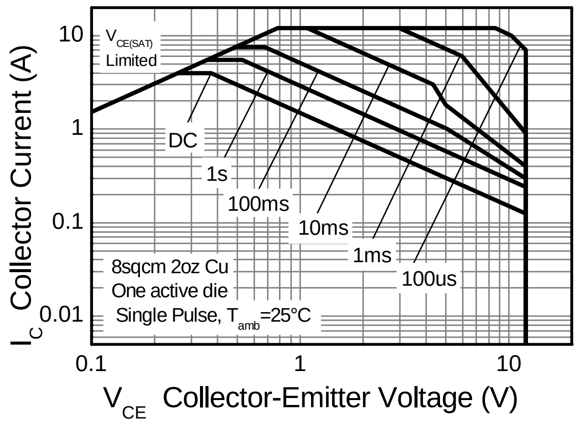
Parameter		Symbol	Limit	Unit
Collector-Base Voltage		V_{CBO}	-20	V
Collector-Emitter Voltage		V_{CEO}	-12	
Emitter-Base Voltage		V_{EBO}	-7	
Peak Pulse Current		I_{CM}	-12	A
Continuous Collector Current	(Notes 4 and 7)	I_C	-4	
	(Notes 5 and 7)		-4.4	
Base Current		I_B	-1	

PNP - Thermal Characteristics @ T_A = 25°C unless otherwise specified

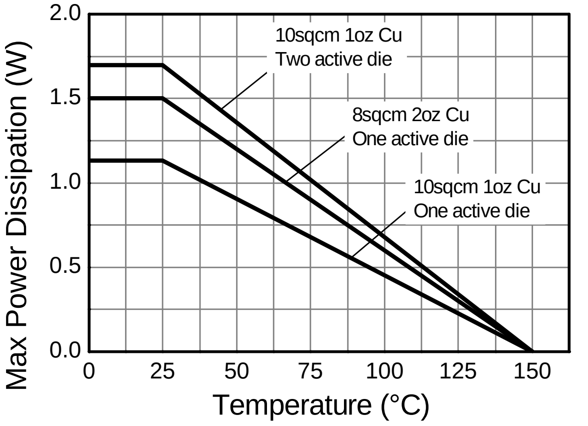
Characteristic		Symbol	Value	Unit
Power Dissipation Linear Derating Factor	(Notes 4 & 7)	P_D	1.5 12	W mW/°C
	(Notes 5 & 7)		2.45 19.6	
	(Notes 6 & 7)		1.13 8	
	(Notes 6 & 8)		1.7 13.6	
Thermal Resistance, Junction to Ambient	(Notes 4 & 7)	$R_{\theta JA}$	83.3	°C/W
	(Notes 5 & 7)		51.0	
	(Notes 6 & 7)		111	
	(Notes 6 & 8)		73.5	
Thermal Resistance, Junction to Lead	(Note 9)	$R_{\theta JL}$	17.1	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Notes:
4. For a dual device surface mounted on 28mm x 28mm (8cm^2) FR4 PCB with high coverage of single sided 2 oz copper, in still air conditions; the device is measured when operating in a steady-state condition. The heatsink is split in half with the exposed collector and cathode pads connected to each half.
5. Same as note (4), except the device is measured at t <5 sec.
6. Same as note (4), except the device is surface mounted on 31mm x 31mm (10cm^2) FR4 PCB with high coverage of single sided 1oz copper.
7. For a dual device with one active die.
8. For dual device with 2 active die running at equal power.
9. Thermal resistance from junction to solder-point (on the exposed collector pad).

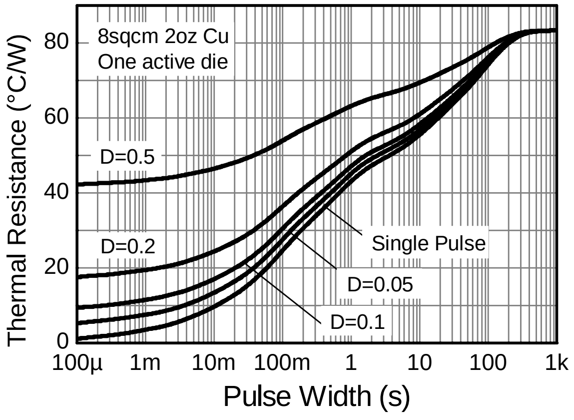
PNP - Thermal Characteristics



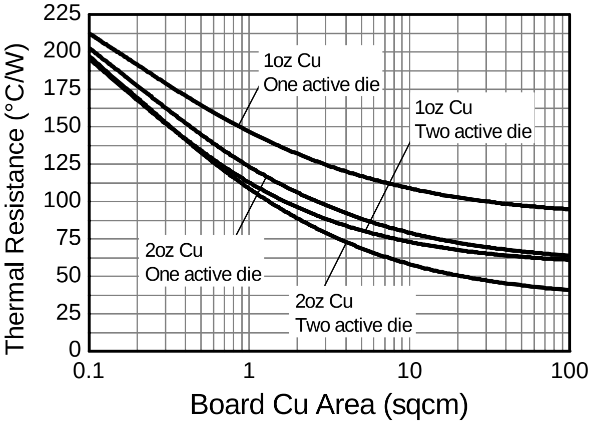
Safe Operating Area



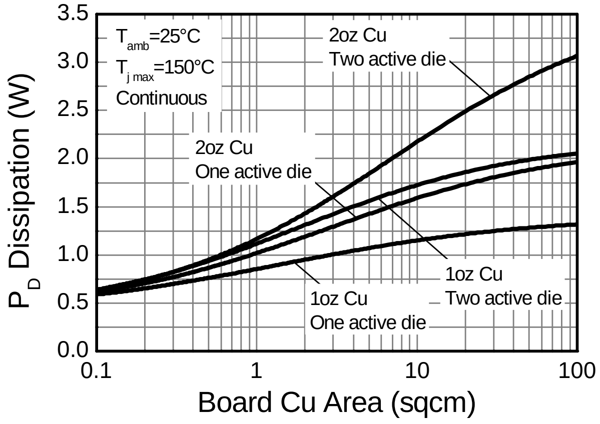
Derating Curve



Transient Thermal Impedance



Thermal Resistance v Board Area



Power Dissipation v Board Area

Schottky - Maximum Ratings @ T_A = 25°C unless otherwise specified

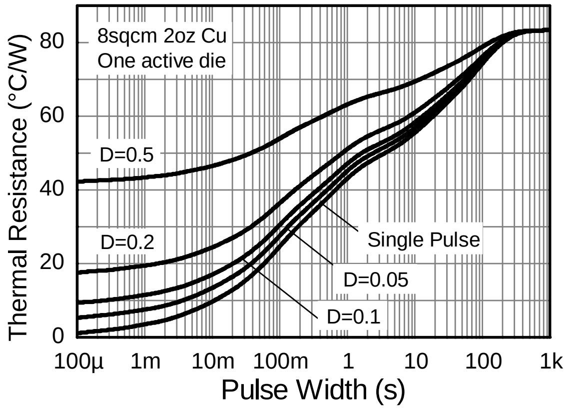
Parameter		Symbol	Limit	Unit
Continuous Reverse Voltage		V_R	40	V
Continuous Forward Current		I_F	1.85	A
Repetitive Peak Forward Current	D = 0.5 Pulse width ≤ 300µs	I_{FRM}	3	
Non-Repetitive Peak Forward Surge Current	t ≤ 100µs	I_{FSM}	12	
	t ≤ 10ms		7	

Schottky - Thermal Characteristics @ T_A = 25°C unless otherwise specified

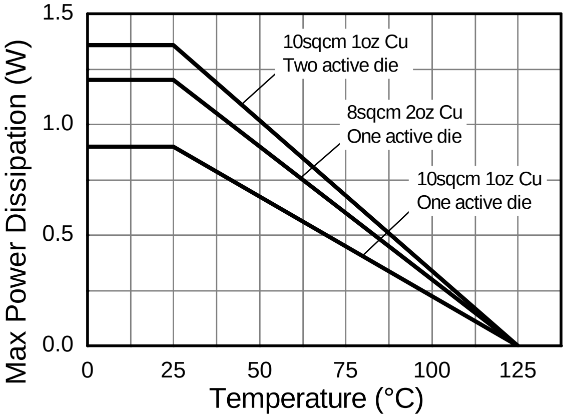
Characteristic		Symbol	Value	Unit
Power Dissipation Linear Derating Factor	(Notes 10 & 13)	P_D	1.2 12	W mW/°C
	(Notes 11 & 13)		2 20	
	(Notes 12 & 13)		0.9 9	
	(Notes 12 & 14)		1.36 13.6	
Thermal Resistance, Junction to Ambient	(Notes 10 & 13)	$R_{\theta JA}$	83.3	°C/W
	(Notes 11 & 13)		51.0	
	(Notes 12 & 13)		111	
	(Notes 12 & 14)		73.5	
Thermal Resistance, Junction to Lead	(Note 15)	$R_{\theta JL}$	20.2	
Storage Temperature Range		T_{STG}	-55 to +150	°C
Maximum Junction Temperature		T_J	125	

Notes:
10. For a dual device surface mounted on 28mm x 28mm (8cm^2) FR4 PCB with high coverage of single sided 2 oz copper, in still air conditions; the device is measured when operating in a steady-state condition. The heatsink is split in half with the exposed cathode and collector pads connected to each half.
11. Same as note (10), except the device is measured at t <5 sec.
12. Same as note (10), except the device is surface mounted on 31mm x 31mm (10cm^2) FR4 PCB with high coverage of single sided 1oz copper.
13. For a dual device with one active die.
14. For dual device with 2 active die running at equal power.
15. Thermal resistance from junction to solder-point (on the exposed cathode pad).

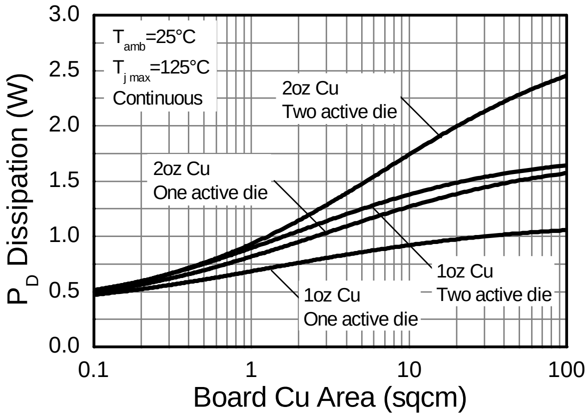
Schottky - Thermal Characteristics



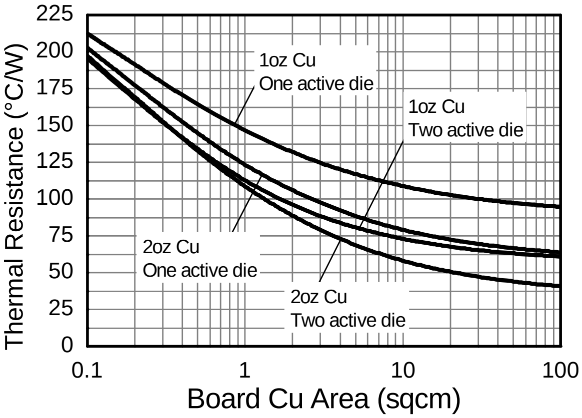
Transient Thermal Impedance



Derating Curve



Power Dissipation v Board Area



Thermal Resistance v Board Area

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

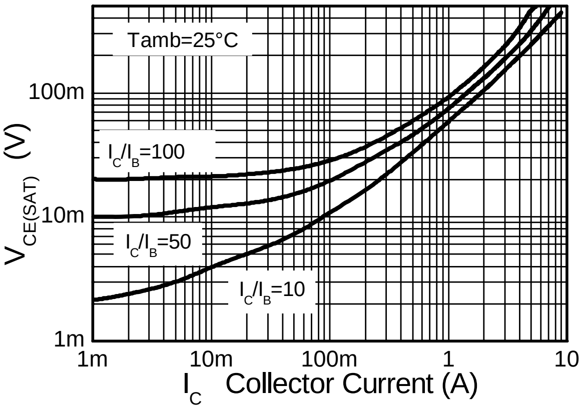
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	-20	-35	-	V	I_C = -100µA
Collector-Emitter Breakdown Voltage (Note 16)	BV_{CEO}	-12	-25	-	V	I_C = -10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	-7	-8.5	-	V	I_E = -100µA
Collector Cutoff Current	I_{CBO}	-	-	-100	nA	V_{CB} = -16V
Emitter Cutoff Current	I_{EBO}	-	-	-100	nA	V_{EB} = -6V
Collector Emitter Cutoff Current	I_{CES}	-	-	-100	nA	V_{CES} = -10V
Static Forward Current Transfer Ratio (Note 16)	h_{FE}	300	475	-	-	I_C = -10mA, V_{CE} = -2V
		300	450	-		I_C = -100mA, V_{CE} = -2V
		180	275	-		I_C = -2.5A, V_{CE} = -2V
		60	100	-		I_C = -8A, V_{CE} = -2V
		45	70	-		I_C = -10A, V_{CE} = -2V
Collector-Emitter Saturation Voltage (Note 16)	$V_{CE(sat)}$	-	-10	-17	mV	I_C = -0.1A, I_B = -10mA
		-	-100	-140		I_C = -1A, I_B = -10mA
		-	-100	-150		I_C = -1.5A, I_B = -50mA
		-	-195	-300		I_C = -3A, I_B = -50mA
		-	-240	-310		I_C = -4A, I_B= -150mA
Base-Emitter Turn-On Voltage (Note 16)	$V_{BE(on)}$	-	-0.87	-0.96	V	I_C = -4A, V_{CE} = -2V
Base-Emitter Saturation Voltage (Note 16)	$V_{BE(sat)}$	-	-0.97	-1.07	V	I_C= -4A, I_B = -150mA
Output Capacitance	C_{obo}	-	21	30	pF	V_{CB} = -10V, f = 1MHz
Transition Frequency	f_T	100	110	-	MHz	V_{CE} = -10V, I_C = -50mA, f = 100MHz
Turn-on Time	t_{on}	-	70	-	Ns	V_{CC} = -6V, I_C = -2A I_{B1} = I_{B2} = -50mA
Turn-off Time	t_{off}	-	130	-	Ns	

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

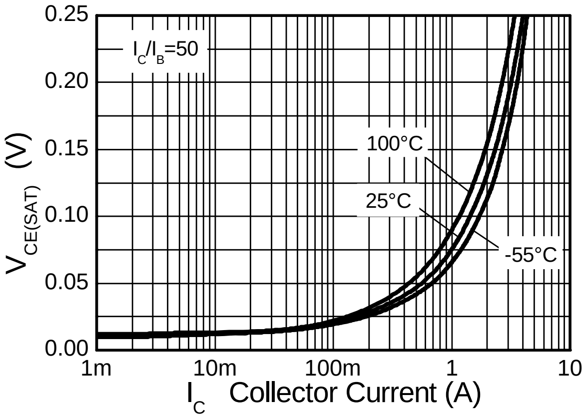
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Breakdown Voltage	BV_R	40	60	-	V	I_R = -300µA
Forward Voltage (Note 16)	V_F	-	240	270	mV	I_F = 50mA
		-	265	290		I_F = 100mA
		-	305	340		I_F = 250mA
		-	355	400		I_F = 500mA
		-	390	450		I_F = 750mA
		-	425	500		I_F = 1000mA
		-	495	600		I_F = 1500mA
		-	420	-		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: 16. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

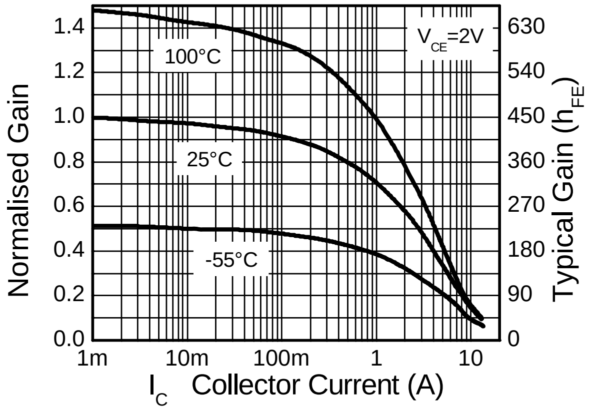
PNP - Typical Electrical Characteristics



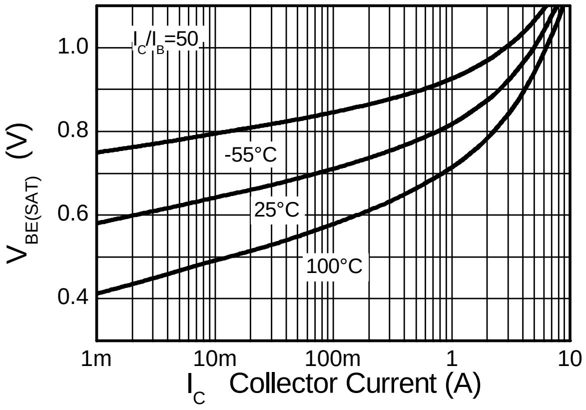
$V_{CE(SAT)}$ v I_C



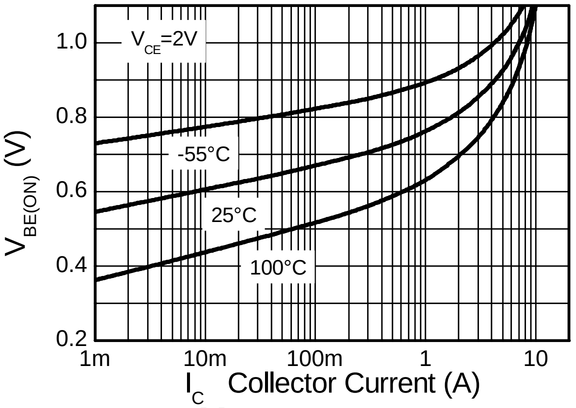
$V_{CE(SAT)}$ v I_C



h_{FE} v I_C

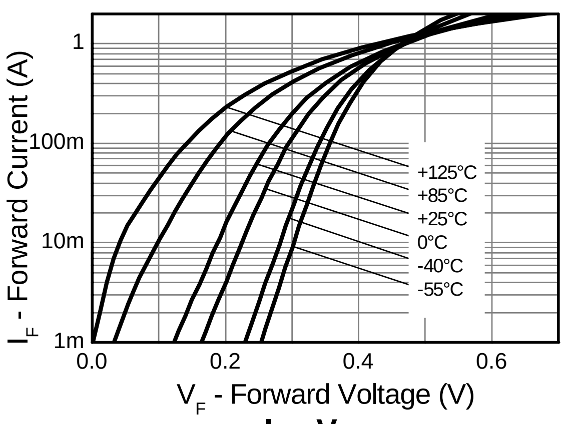


$V_{BE(SAT)}$ v I_C

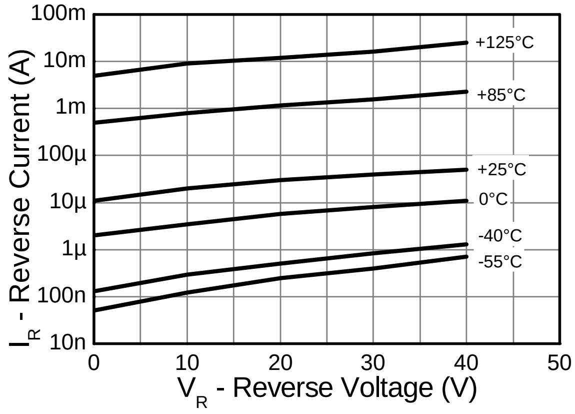


$V_{BE(ON)}$ v I_C

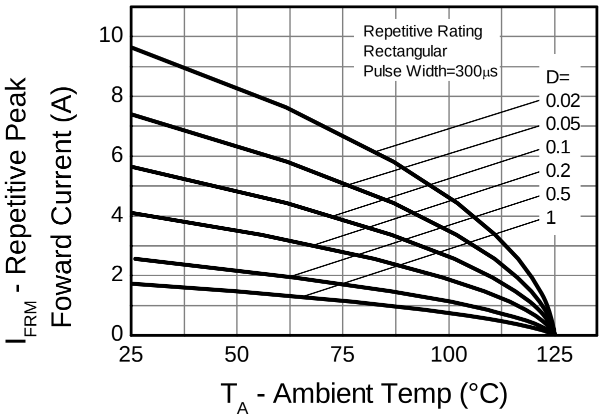
Schottky - Typical Electrical Characteristics



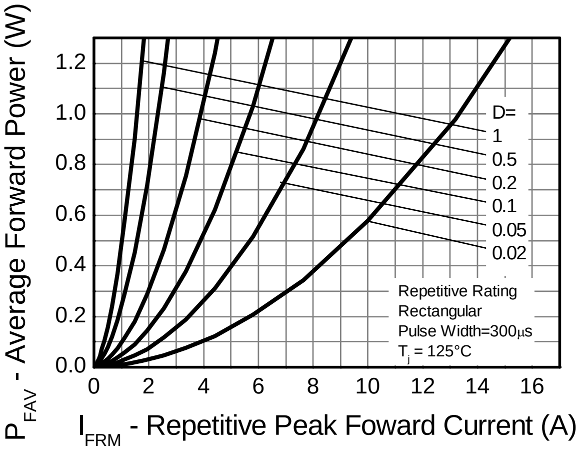
I_F v V_F



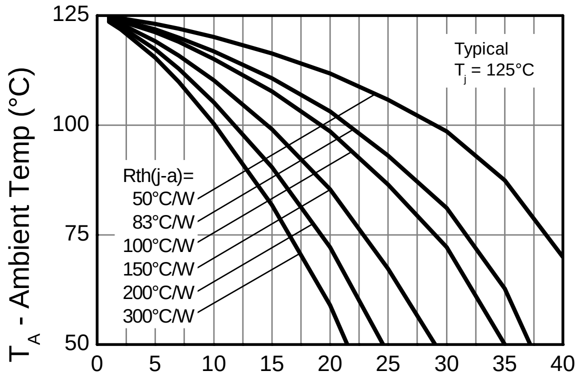
I_R v V_R



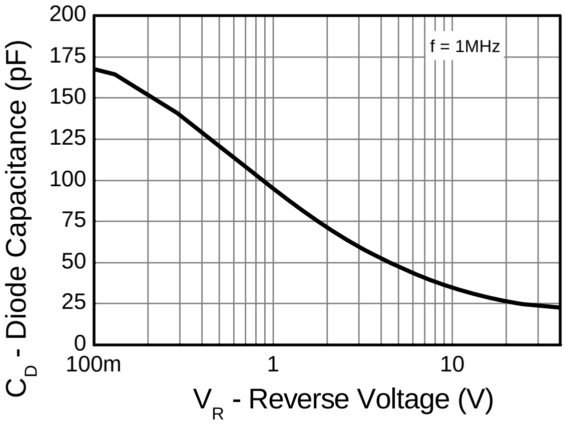
I_{FRM} v T_A



P_{FAV} v I_{FRM}

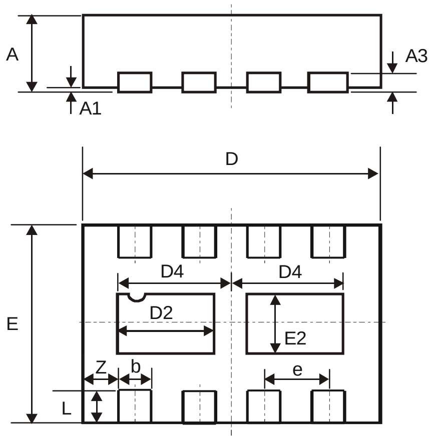


T_A v V_R



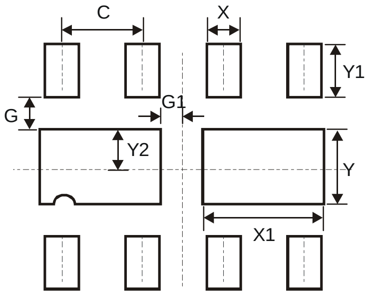
C_D v V_R

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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