MATCHED DUAL NPN TRANSISTORS IN U-DFN2020-6

Features

- BV_{CEO} > 120V
- I_C = 1A Continuous Current
- $R_{CE(sat)}$ = 240mΩ
- 2% Matched Tolerance: $V_{BE(sat)}$ & $V_{BE(on)}$
- 4% Matched Tolerance: h_{FE}
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

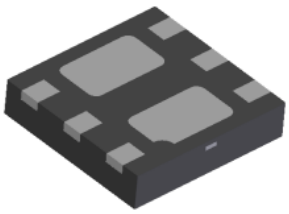
Mechanical Data

- Package: U-DFN2020-6
- Package Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – NiPdAu. Solderable per MIL-STD-202, Method 208 e4
- Weight: 0.007 grams (Approximate)

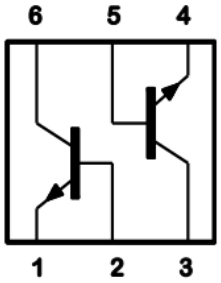
Applications

- Current mirrors
- Differential amplifiers
- Linear voltage regulators
- MOSFET drivers
- Load switches
- Power management
- Charging circuits

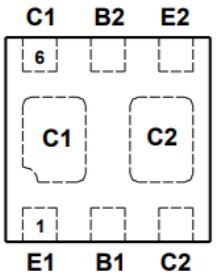
U-DFN2020-6 (Type B)



Bottom View



Device Symbol



Top View
Pin-Out

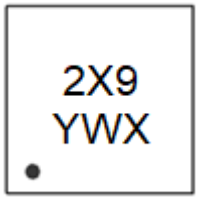
Ordering Information (Note 4)

Orderable Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
DSS4112FDB-7	U-DFN2020-6 (Type B)	2X9	7	8	3,000	Reel

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information

U-DFN2020-6 (Type B)



2X9 = Product Type Marking Code
Y = Year: 0 to 9
W = Week: A to Z: 1 to 26 Week;
a to z: 27 to 52 Week; z Represents
52 and 53 Week
X = A to G: Internal Code

Date Code Key

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Code	5	6	7	8	9	0	1	2	3	4	5	6

Week	1-26	27-52	53
Code	A-Z	a-z	z

Internal Code	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Green	A	B	C	D	E	F	G

Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	150	V
Collector-Emitter Voltage	V_{CEO}	120	V
Emitter-Base Voltage	V_{EBO}	8	V
Continuous Collector Current	I_C	1	A
Peak Collector Current	I_{CM}	1.5	A

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	0.42	W
	(Note 6)		0.53	
	(Note 7)		0.66	
	(Note 8)		0.88	
	(Note 9)		0.85	
	(Note 10)		1.2	
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	295	°C/W
	(Note 6)		235	
	(Note 7)		190	
	(Note 8)		142	
	(Note 9)		147	
	(Note 10)		104	
Thermal Resistance, Junction to Case	(Note 5)	$R_{\theta JC}$	53	°C/W
	(Note 6)		64	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

ESD Ratings (Note 11)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge – Human Body Model	ESD HBM	4000	V	3A
Electrostatic Discharge – Machine Model	ESD MM	400	V	C
Electrostatic Discharge – Charge Device Model	ESD CDM	1000	V	IV

Notes:
5. For a device mounted with the exposed collector pad mounted on MRP 1oz copper single sided FR4 PCB, device is measured under still air conditions whilst operating in the steady state. Tested with one active die running.
6. Same as Note 5 but with two active die running.
7. For a device with each exposed collector pad mounted on 5mm × 5mm 1oz copper single sided FR4 PCB, device is measured under still air conditions whilst operating in the steady state. Tested with one active die running.
8. Same as Note 7 but with two active die running.
9. For a device with each exposed collector pad mounted on 10mm × 10mm 1oz copper single sided FR4 PCB, device is measured under still air conditions whilst operating in the steady state. Tested with one active die running.
10. Same as Note 9 but with two active die running.
11. Refer to JEDEC specifications JESD22-A114, JESD22-A115 & JS-002.

Thermal Characteristics and Derating Information

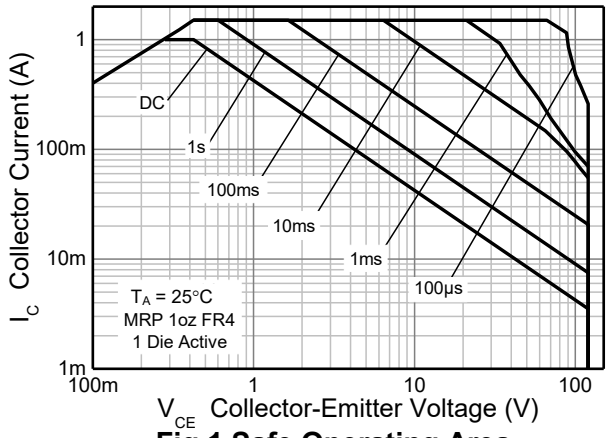


Fig.1 Safe Operating Area

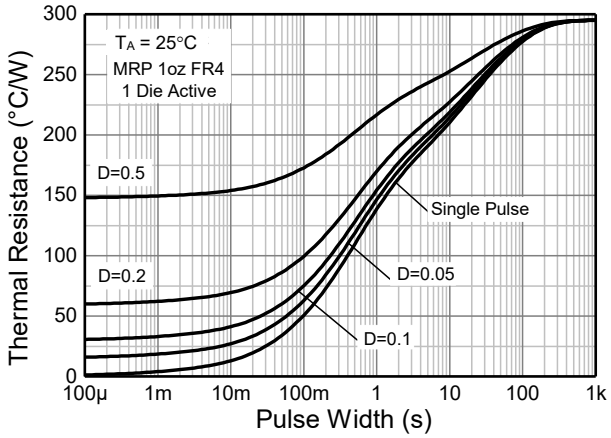


Fig.2 Transient Thermal Impedance

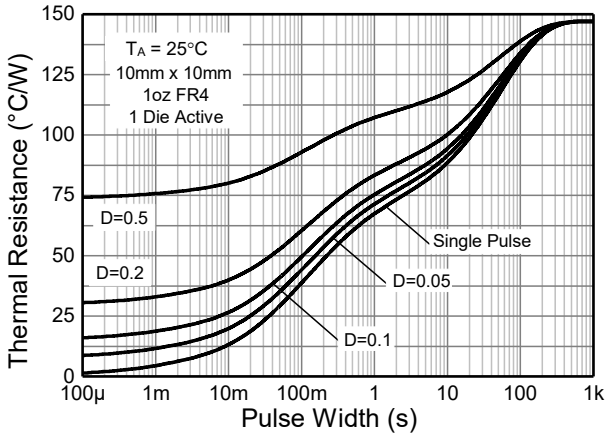


Fig.3 Transient Thermal Impedance

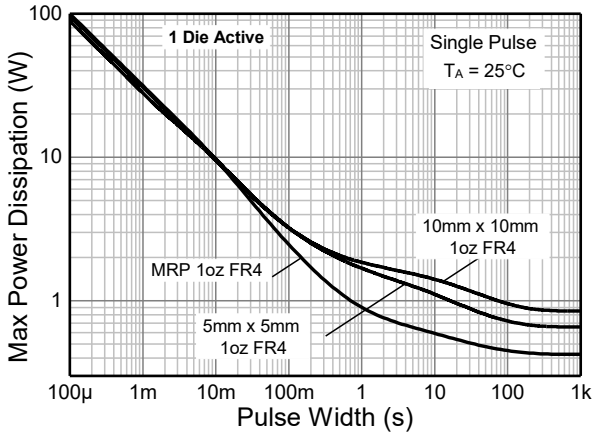


Fig.4 Pulse Power Dissipation

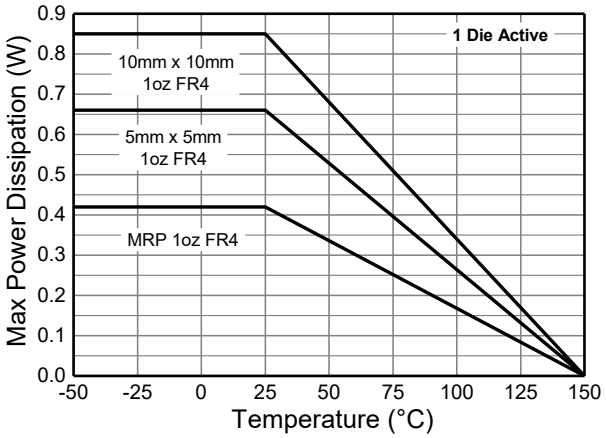


Fig.5 Derating Curve

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV_{CBO}	150	295	—	V	I_C = 100µA
Collector-Emitter Breakdown Voltage (Note 12)	BV_{CEO}	120	145	—	V	I_C = 10mA
Emitter-Base Breakdown Voltage	BV_{EBO}	8	9.3	—	V	I_E = 100µA
Collector-Base Cutoff Current	I_{CBO}	—	1 0.2	100 10	nA µA	V_{CB} = 120V, I_E = 0 V_{CB} = 120V, I_E = 0, T_J = +150°C
Emitter Cutoff Current	I_{EBO}	—	1	50	nA	V_{EB} = 7V
ON CHARACTERISTICS (Note 12)						
DC Current Gain	h_{FE}	250 300 80 30	415 410 130 44	— 600 — —	—	I_C = 10mA, V_{CE} = 2V I_C = 100mA, V_{CE} = 2V I_C = 500mA, V_{CE} = 2V I_C = 1A, V_{CE} = 2V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	66 175 113	120 260 220	mV	I_C = 500mA, I_B = 50mA I_C = 1A, I_B = 50mA I_C = 1A, I_B = 100mA
Collector-Emitter Saturation Resistance	$R_{CE(sat)}$	—	—	240	mΩ	I_C = 500mA, I_B = 50mA
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	0.82 0.84 0.87	1 1.1 1.1	V	I_C = 500mA, I_B = 50mA I_C = 1A, I_B = 50mA I_C = 1A, I_B = 100mA
Base-Emitter Turn-On Voltage	$V_{BE(on)}$	—	750	900	mV	I_C = 500mA, V_{CE} = 2V
MATCHING CHARACTERISTICS						
DC Current Gain Matching	h_{FE1}/h_{FE2}	-4%	—	+4%	—	I_C = 100mA, V_{CE} = 2V
Base-Emitter Turn-On Voltage Matching	$V_{BE(on)1}$- $V_{BE(on)2}$	-2%	—	+2%	—	I_C = 500mA, V_{CE} = 2V
Collector-Emitter Saturation Voltage Matching	$V_{CE(sat)1}$/ $V_{CE(sat)2}$	-4%	—	+4%	—	I_C = 1A, I_B = 50mA
Base-Emitter Saturation Voltage Matching	$V_{BE(sat)1}$/ $V_{BE(sat)2}$	-2%	—	+2%	—	I_C = 500mA, I_B = 50mA
SMALL-SIGNAL CHARACTERISTICS						
Output Capacitance	C_{obo}	—	6.75	—	pF	V_{CB} = 10V, f = 1MHz
Current Gain-Bandwidth Product	f_T	120	195	—	MHz	V_{CE} = 10V, I_C = 50mA, f = 100MHz
Delay Time	t_d	—	33	—	ns	V_{CC} = 10V, I_C = 0.5A, I_{B1} = -I_{B2} = 25mA
Rise Time	t_r	—	374	—	ns	
Storage Time	t_s	—	837	—	ns	
Fall Time	t_f	—	291	—	ns	

Note: 12. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

Timing Waveform

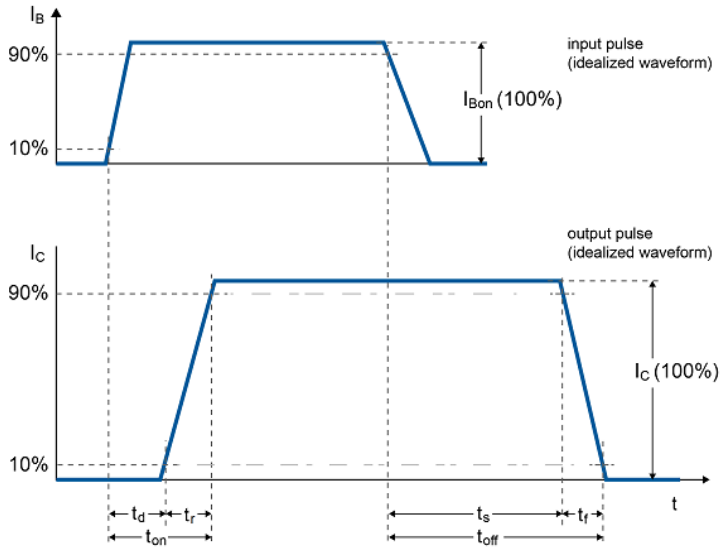


Fig.6 Timing Waveform

Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

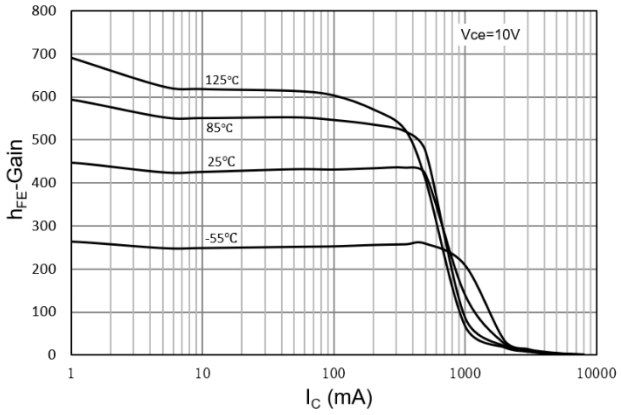


Fig.7 h_{FE} vs I_C

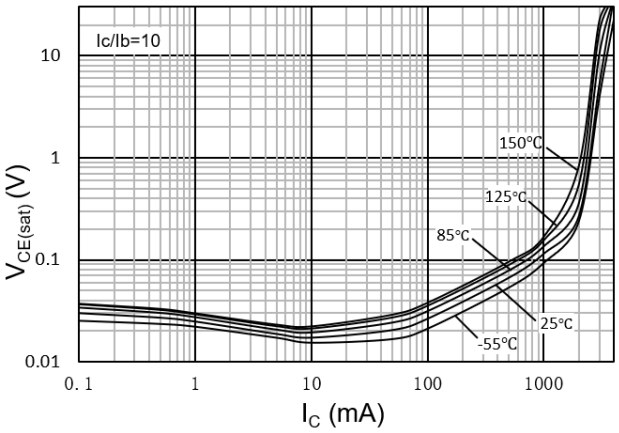


Fig.8 $V_{CE(sat)}$ vs I_C

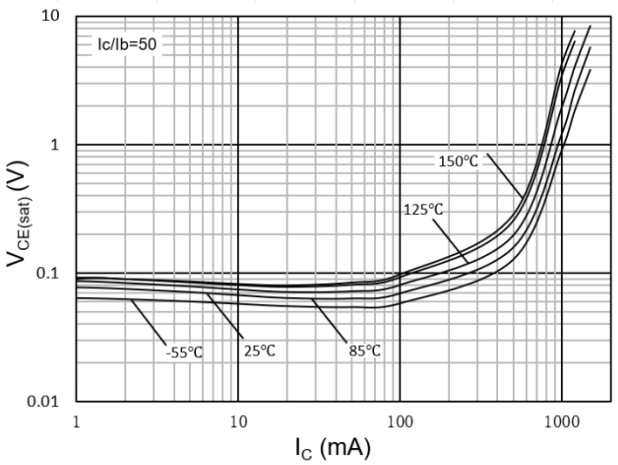


Fig.9 $V_{CE(sat)}$ vs I_C

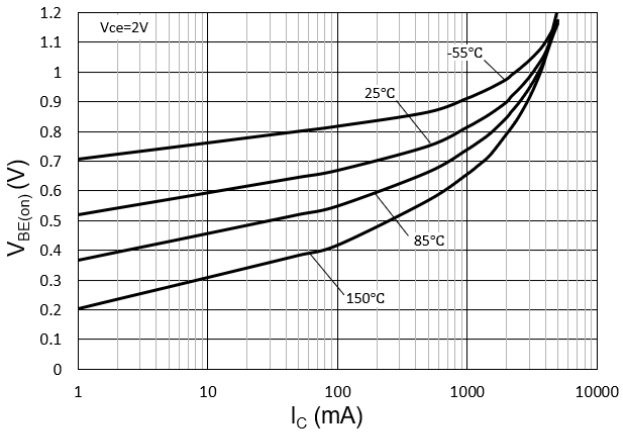


Fig.10 $V_{BE(on)}$ vs I_C

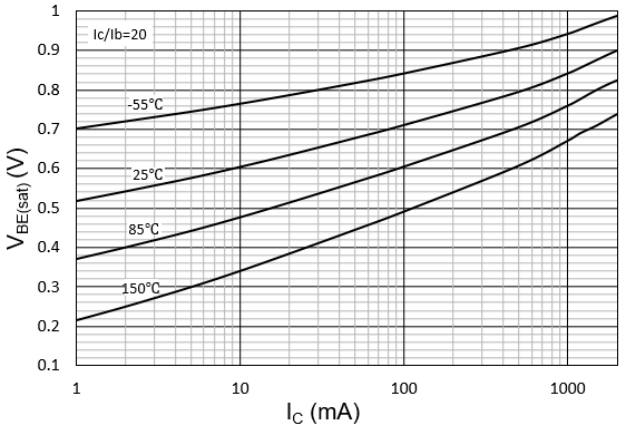
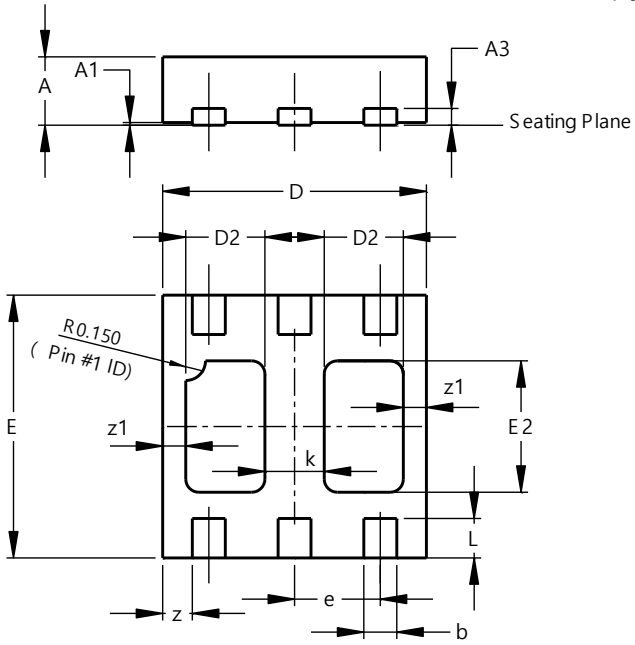


Fig.11 $V_{BE(sat)}$ vs I_C

Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

U-DFN2020-6 (Type B)

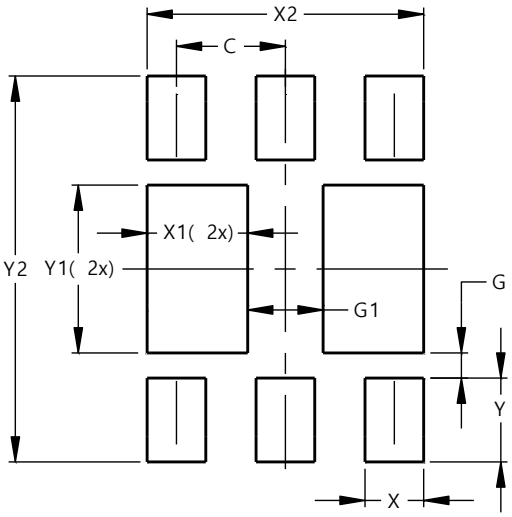


U-DFN2020-6 Type B			
Dim	**Min**	**Max**	**Typ**
A	0.545	0.605	0.575
A1	0.00	0.05	0.02
A3	-	-	0.13
b	0.20	0.30	0.25
D	1.95	2.075	2.00
D2	0.50	0.70	0.60
e	-	-	0.65
E	1.95	2.075	2.00
E2	0.90	1.10	1.00
k	-	-	0.45
L	0.25	0.35	0.30
z	-	-	0.225
z1	-	-	0.175
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

U-DFN2020-6 (Type B)



Dimensions	Value (in mm)
C	0.650
G	0.150
G1	0.450
X	0.350
X1	0.600
X2	1.650
Y	0.500
Y1	1.000
Y2	2.300

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