

25V PNP LOW SAT TRANSISTOR WITH N-CHANNEL MOSFET

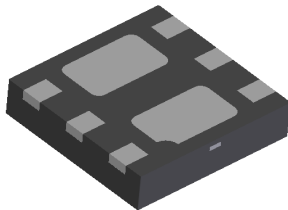
Features

- Combination of PNP low $V_{CE(sat)}$ Transistor and N-Channel MOSFET
- Very low collector-emitter saturation voltage $V_{CE(sat)}$
- High Collector Current Capability I_C and I_{CM}
- High Collector Current Gain (h_{FE}) at high I_C
- P_D up to 2.47W for power demanding applications
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

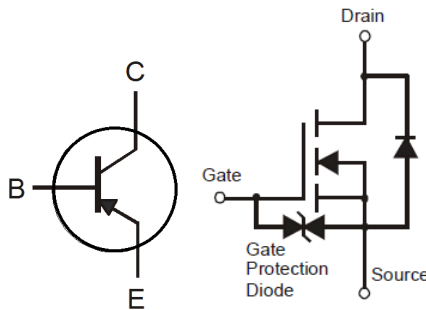
Mechanical Data

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

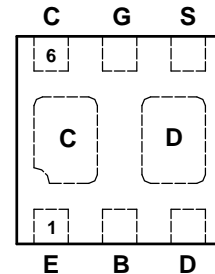
U-DFN2020-6
(Type B)



Top View



Device Symbol



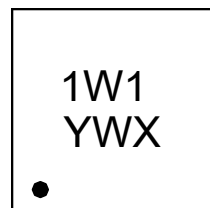
Top View
Pin-Out

Ordering Information (Note 4)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DTM3A25P20NFDB-7	1W1	7	8	3,000

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See http://www.diodes.com/quality/lead_free.html 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 <http://www.diodes.com/products/packages.html>.

Marking Information



- 1W1 = Product Type Marking Code
- Y = Year: 0-9 (Last Digit of the Year)
- W = Week: A-Z: Week 1-26;
a-z: Week 27-52 ;
z represents week 52 and 53
- X = A-Z: Internal Code

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CBO}	-35	V
Collector-Emitter Voltage	V _{CEO}	-25	V
Emitter-Base Voltage	V _{EBO}	-7	V
Continuous Collector Current	I _C	-3	A
Peak Pulse Current	I _{CM}	-6	A
Base Current	I _B	-500	mA

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

Characteristic	Symbol	Value	Units
Drain-Source Voltage	V _{DSS}	20	V
Gate-Source Voltage	V _{GSS}	±6	V
Continuous Drain Current (Note 5) V _{GS} = 10 V	I _D	@T _A = +25°C 0.63	A
		@T _A = +85°C 0.45	
Pulsed Drain Current	I _{DM}	6	A

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

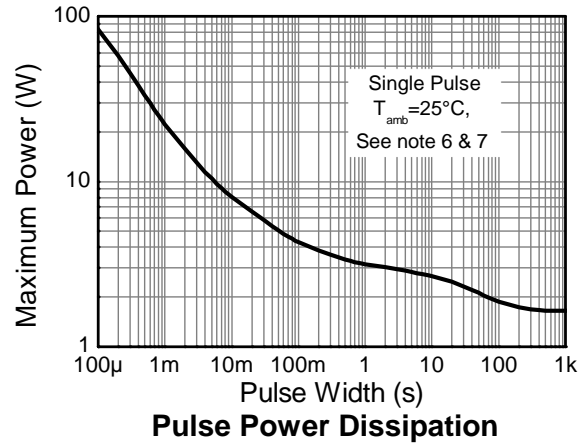
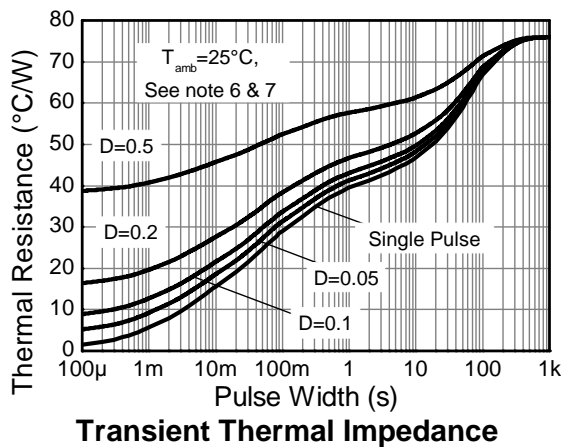
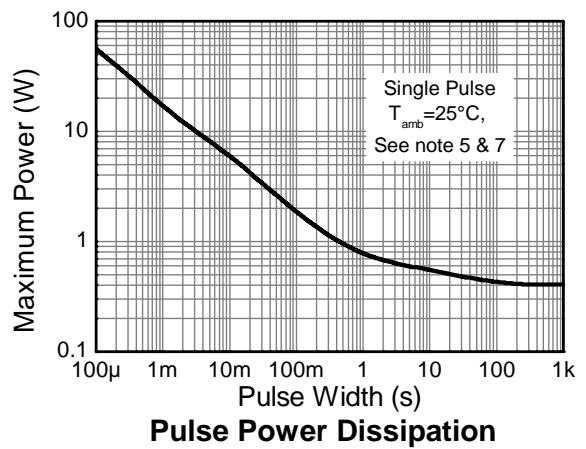
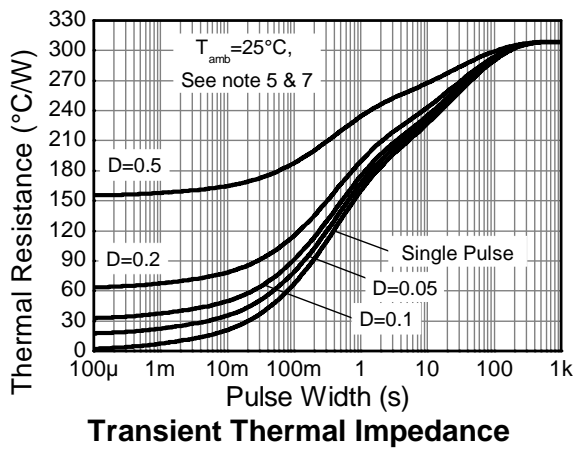
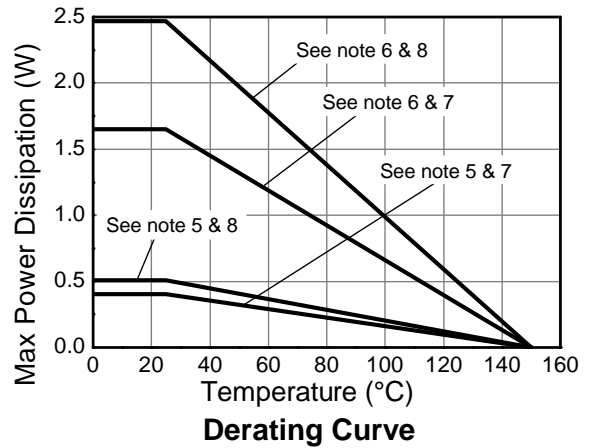
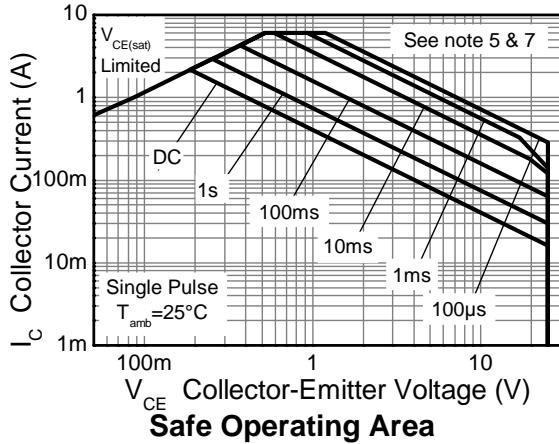
Characteristic	Symbol	Value	Unit
Power Dissipation	P _D	(Notes 5 & 7) 405	mW
		(Notes 5 & 8) 510	
		(Notes 6 & 7) 1,650	
		(Notes 6 & 8) 2,470	
Thermal Resistance, Junction to Ambient	R _{θJA}	(Notes 5 & 7) 308	°C/W
		(Notes 5 & 8) 245	
		(Notes 6 & 7) 76	
		(Notes 6 & 8) 51	
Thermal Resistance, Junction to Lead	(Note 9) R _{θJL}	18	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

ESD Ratings (Note 10)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge – Human Body Model	ESD HBM	3,000	V	3A
Electrostatic Discharge – Machine Model	ESD MM	200	V	C

- Notes:
- For a device mounted with the exposed collector pads on minimum recommended pad layout that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
 - Same as note (5), except the device is mounted with the collector pad on 28mm x 28mm (8cm²) 2oz copper.
 - For a dual device with one active die.
 - For dual device with 2 active die running at equal power.
 - Thermal resistance from junction to solder-point (on the exposed collector pads).
 - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Thermal Characteristics and Derating information

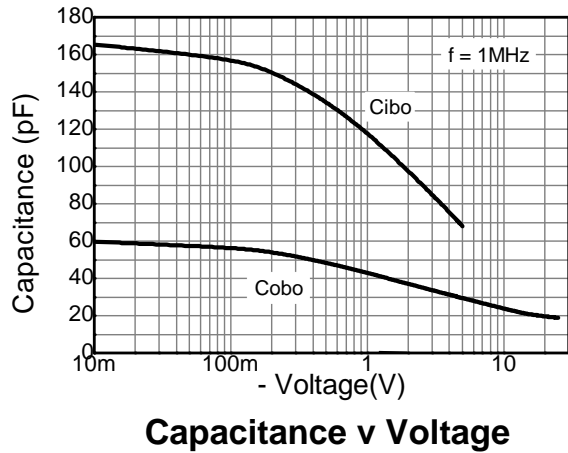
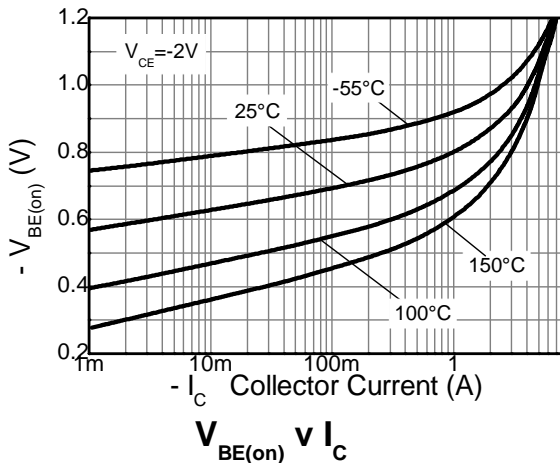
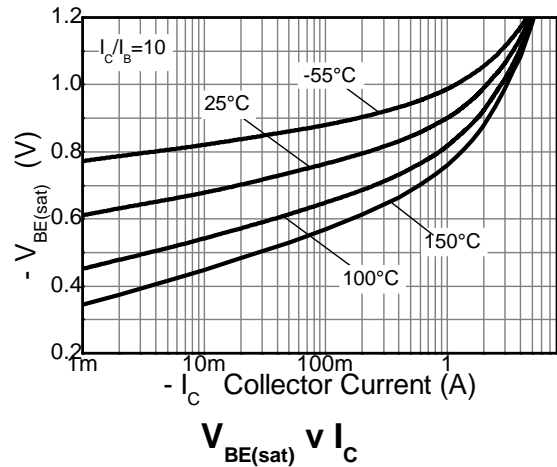
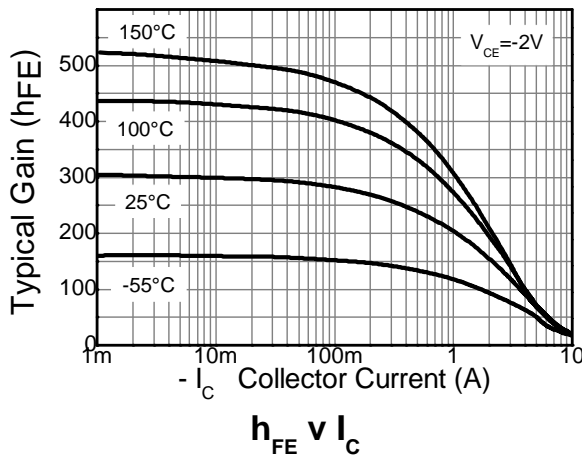
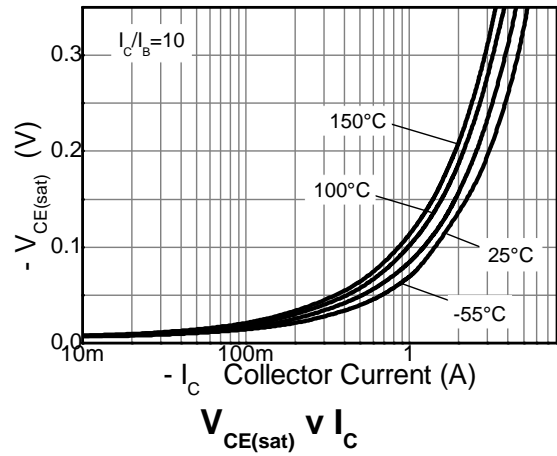
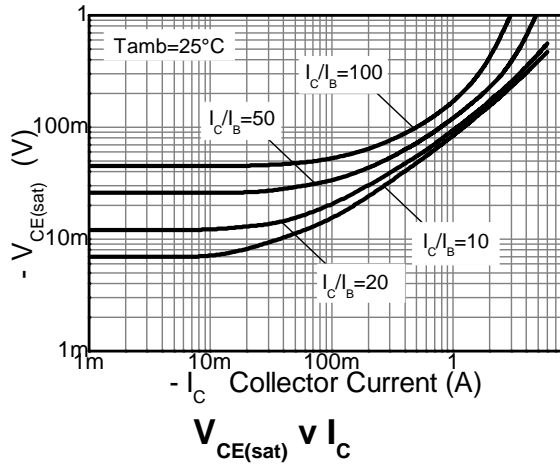


Typical Electrical Characteristics - BJT PNP (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	-35	-60	-	V	$I_C = -100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 11)	BV_{CEO}	-25	-40	-	V	$I_C = -10\text{mA}$
Emitter-Base Breakdown Voltage	BV_{EBO}	-7	-8.4	-	V	$I_E = -100\mu\text{A}$
Collector Cutoff Current	I_{CBO}	-	<1	-50 -0.5	nA μA	$V_{CB} = -28\text{V}$ $V_{CB} = -28\text{V}, T_A = +100^\circ\text{C}$
Emitter Cutoff Current	I_{EBO}	-	<1	-50	nA	$V_{EB} = -5.6\text{V}$
Collector Emitter Cutoff Current	I_{CES}	-	-	-100	nA	$V_{CE} = -32\text{V}$
Static Forward Current Transfer Ratio (Note 11)	h_{FE}	200 130 100 25	320 230 180 50	500 - - -	-	$I_C = -100\text{mA}, V_{CE} = -2\text{V}$ $I_C = -1\text{A}, V_{CE} = -2\text{V}$ $I_C = -2\text{A}, V_{CE} = -2\text{V}$ $I_C = -6\text{A}, V_{CE} = -2\text{V}$
Collector-Emitter Saturation Voltage (Note 11)	$V_{CE(sat)}$	-	-85 -229	-150 -350	mV	$I_C = -1\text{A}, I_B = -100\text{mA}$ $I_C = -3\text{A}, I_B = -300\text{mA}$
Base-Emitter Turn-On Voltage (Note 11)	$V_{BE(on)}$	-	-786	-850	mV	$I_C = -1\text{A}, V_{CE} = -5\text{V}$
Base-Emitter Saturation Voltage (Note 11)	$V_{BE(sat)}$	-	-895	-1,000	mV	$I_C = -1\text{A}, I_B = -100\text{mA}$

Note: 11. Measured under pulsed conditions. Pulse width $\leq 300 \mu\text{s}$. Duty cycle $\leq 2\%$.

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



Typical Electrical Characteristics – MOS N-Channel (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 12)						
Drain-Source Breakdown Voltage	BV _{DSS}	20	—	—	V	V _{GS} = 0V, I _D = 250μA
Zero Gate Voltage Drain Current T _J = +25°C	I _{DSS}	—	—	100	nA	V _{DS} = 20V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±1.0	μA	V _{GS} = ±4.5V, V _{DS} = 0V
ON CHARACTERISTICS (Note 12)						
Gate Threshold Voltage	V _{GS(th)}	0.5	—	1.0	V	V _{DS} = V _{GS} , I _D = 250μA
Static Drain-Source On-Resistance	R _{DS(ON)}	—	0.3	0.4	Ω	V _{GS} = 4.5V, I _D = 600mA
			0.4	0.5		V _{GS} = 2.5V, I _D = 500mA
			0.5	0.7		V _{GS} = 1.8V, I _D = 350mA
Forward Transfer Admittance	Y _{FS}	—	1.4	—	S	V _{DS} = 10V, I _D = 400mA
Diode Forward Voltage	V _{SD}	—	0.7	1.2	V	V _{GS} = 0V, I _D = 150mA
DYNAMIC CHARACTERISTICS (Note 13)						
Input Capacitance	C _{iSS}	—	60.67	—	pF	V _{DS} = 16V, V _{GS} = 0V f = 1.0MHz
Output Capacitance	C _{oSS}	—	9.68	—	pF	
Reverse Transfer Capacitance	C _{rSS}	—	5.37	—	pF	
Total Gate Charge	Q _G	—	736.6	—	pC	V _{GS} = 4.5V, V _{DS} = 10V, I _D = 250mA
Gate-to-Source Charge	Q _{GS}	—	93.6	—	pC	
Gate-to-Drain Charge	Q _{GD}	—	116.6	—	pC	
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(on)}	—	5.1	—	ns	V _{DD} = 10V, V _{GS} = 4.5V, R _L = 47Ω, R _G = 10Ω, I _D = 200mA
Rise Time	t _r	—	7.4	—		
Turn-Off Delay Time	t _{d(off)}	—	26.7	—		
Fall Time	t _f	—	12.3	—		

- Notes: 12. Short duration pulse test used to minimize self-heating effect.
13. Guaranteed by design. Not subject to production testing.

Typical Electrical Characteristics – MOS N-Channel (@T_A = +25°C, unless otherwise specified.)

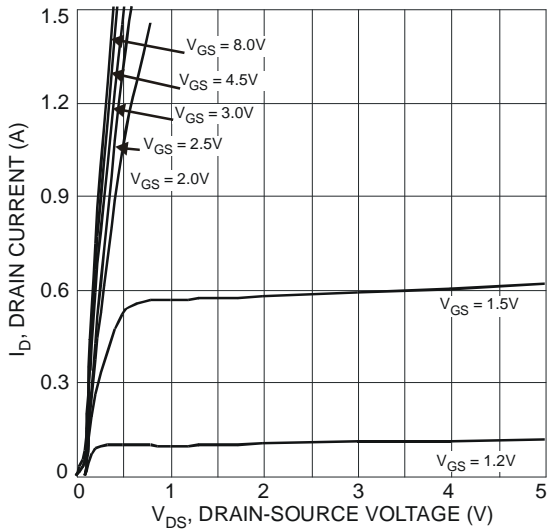


Fig. 1 Typical Output Characteristics

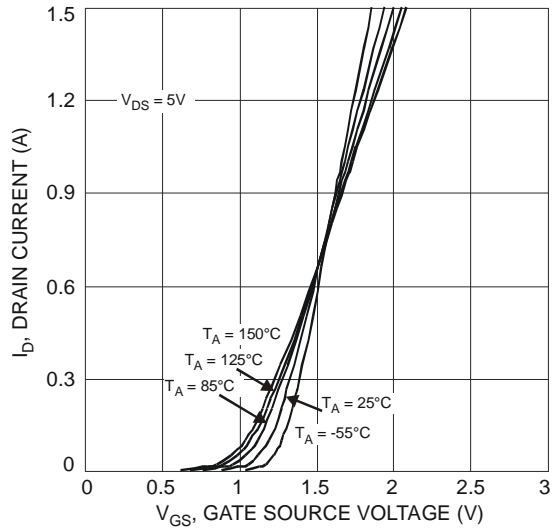


Fig. 2 Typical Transfer Characteristics

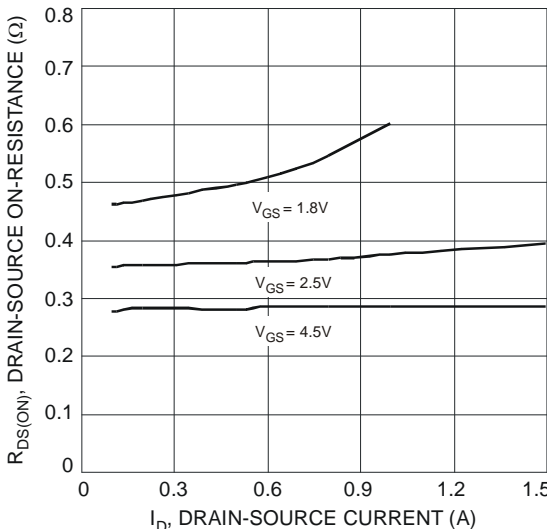


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

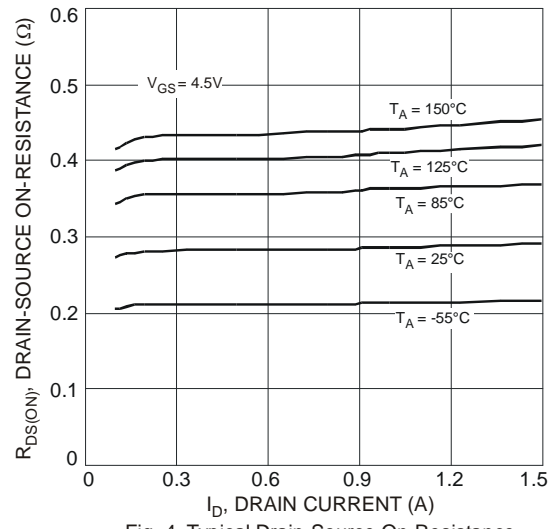


Fig. 4 Typical Drain-Source On-Resistance vs. Drain Current and Temperature

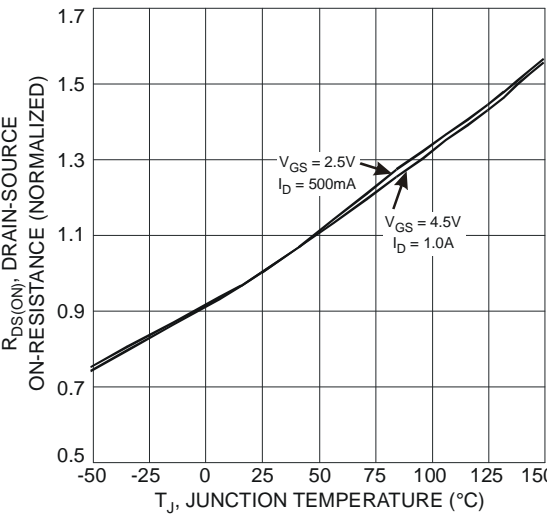


Fig. 5 On-Resistance Variation with Temperature

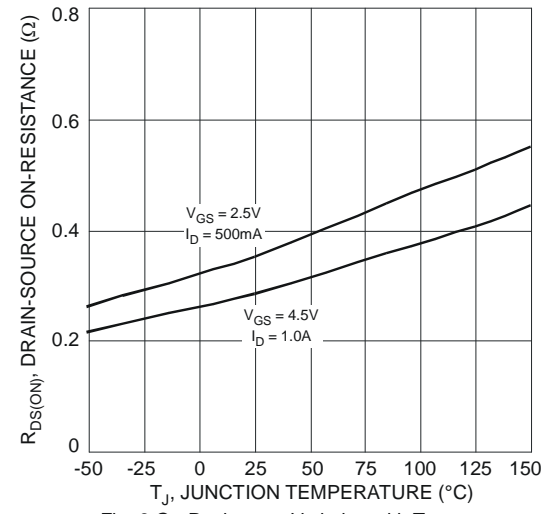


Fig. 6 On-Resistance Variation with Temperature

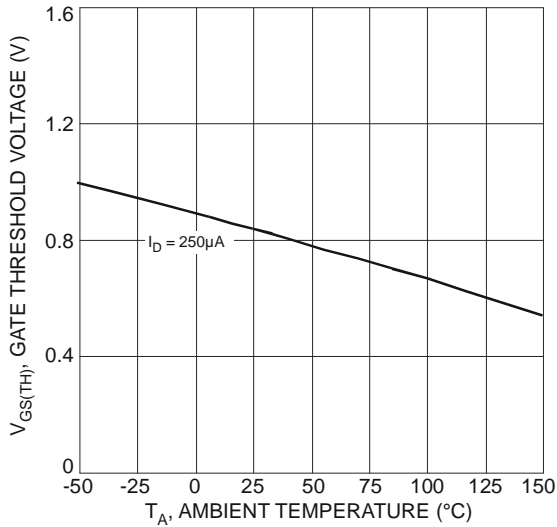


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

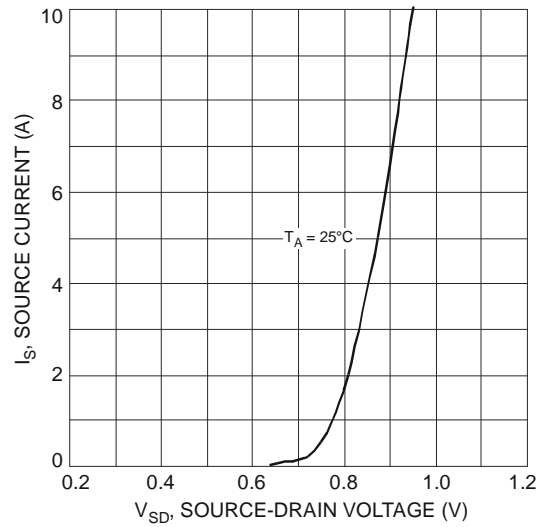


Fig. 8 Diode Forward Voltage vs. Current

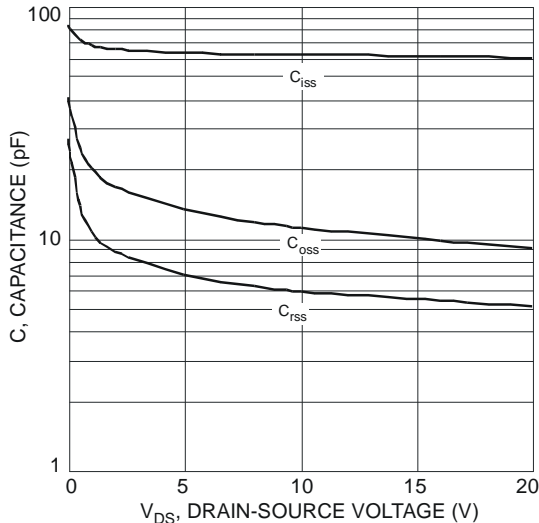


Fig. 9 Typical Capacitance

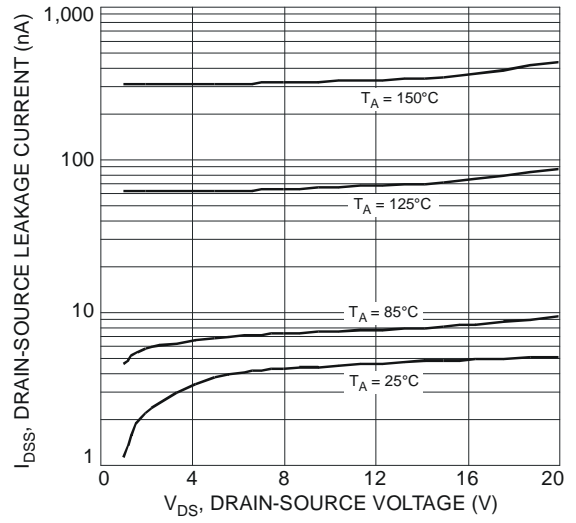


Fig. 10 Typical Drain-Source Leakage Current vs. Drain-Source Voltage

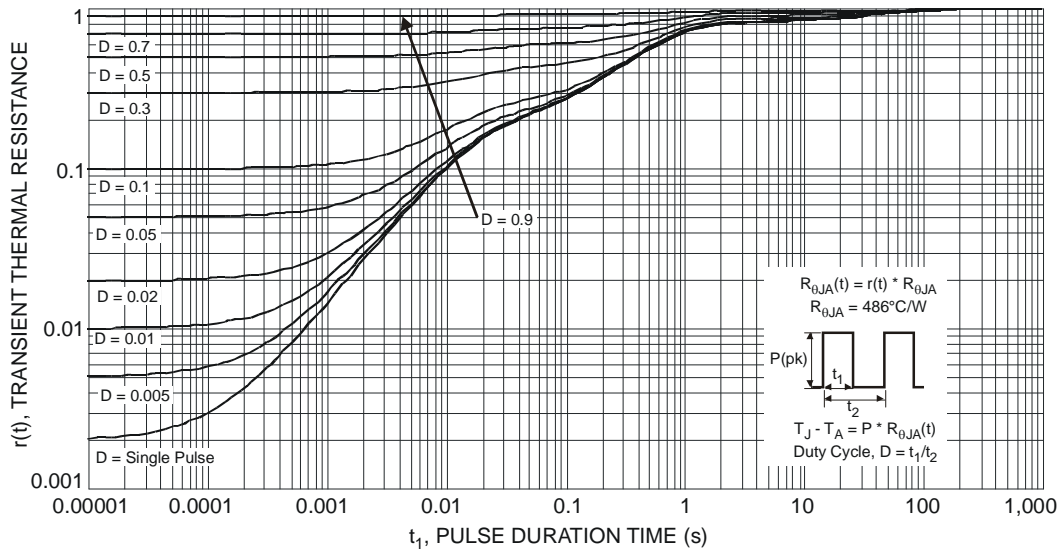
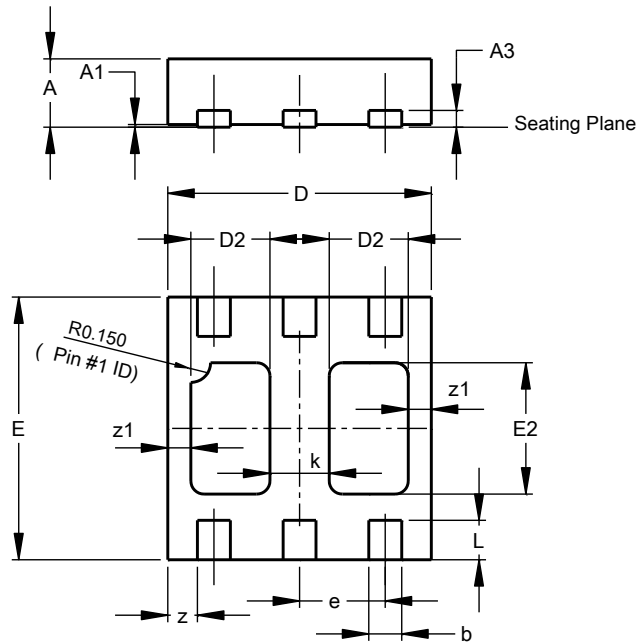


Fig. 11 Transient Thermal Response

Package Outline Dimensions

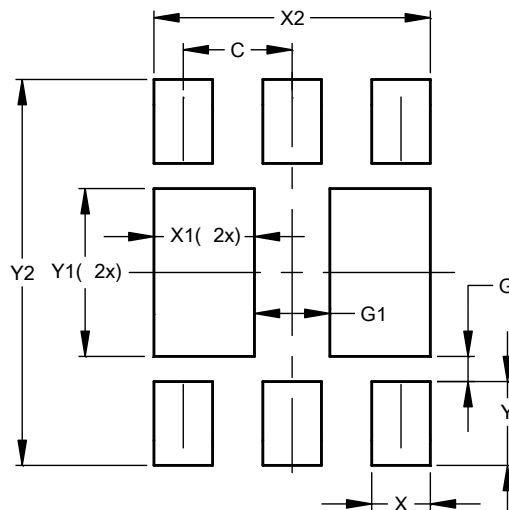
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



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.



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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