



YOUSHANG SEMICONDUCTOR

**设计研发新型功率器件**

**各类小信号开关**

**中低压及高压大电流等场效应管**

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## Features

- $BV_{CEO} > 60V$
- Small Form Factor Thermally Efficient Package Enables Higher Density End Products
- $I_C = 3A$  High Continuous Current
- $I_{CM} = 6A$  Peak Pulse Current
- Low Saturation Voltage  $V_{CE(SAT)} < 250mV @ 1A$
- Complementary PNP Type: NK-DXTP07060BFG
- Rated to  $+175^{\circ}C$  – Ideal For High Temperature Environment
- Wettable Flank For Improved Optical Inspection

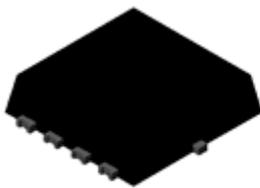
## Mechanical Data

- Case: PowerDI<sup>®</sup>3333-8
- Case Material: Molded Plastic. "Green" Molding Compound UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.03 grams (Approximate)

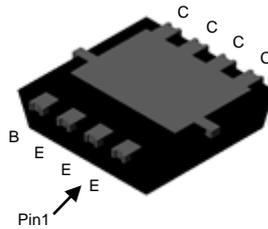
## Applications

- Load Switch
- Linear Regulator

PowerDI3333-8 (SWP) (Type UX)

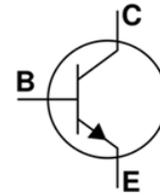


Top View



Bottom View

Equivalent Circuit



Device Symbol

### Absolute Maximum Ratings (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	80	V
Collector-Emitter Voltage	V <sub>CEO</sub>	60	V
Emitter-Base Voltage	V <sub>EBO</sub>	7	V
Continuous Collector Current	I <sub>C</sub>	3	A
Peak Pulse Current	I <sub>CM</sub>	6	A

### Thermal Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

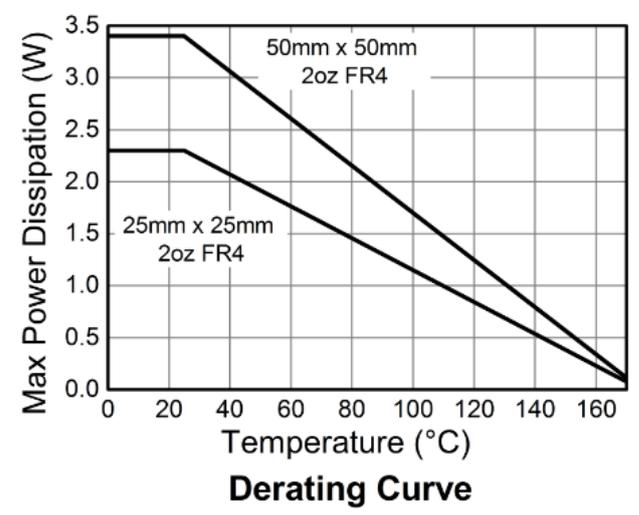
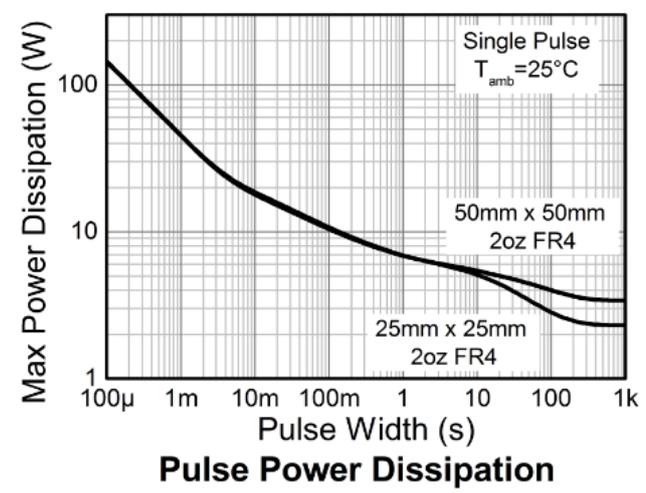
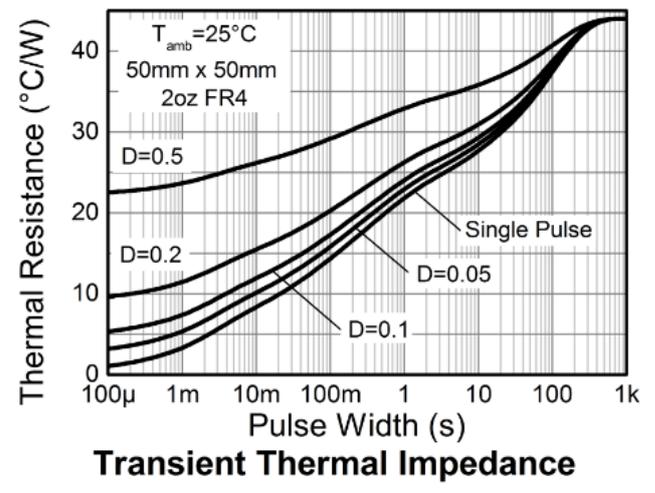
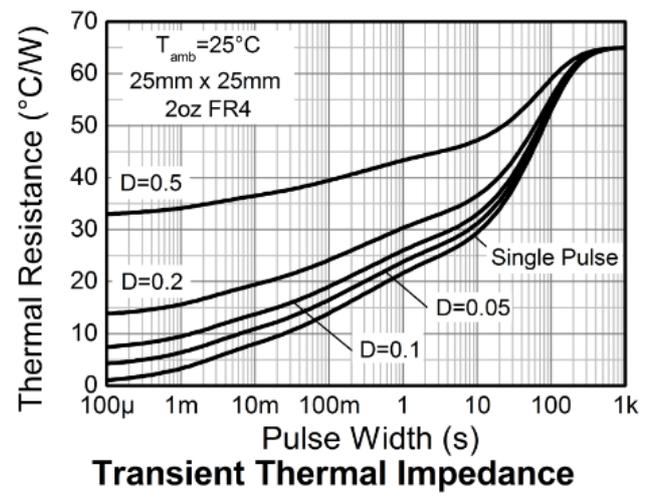
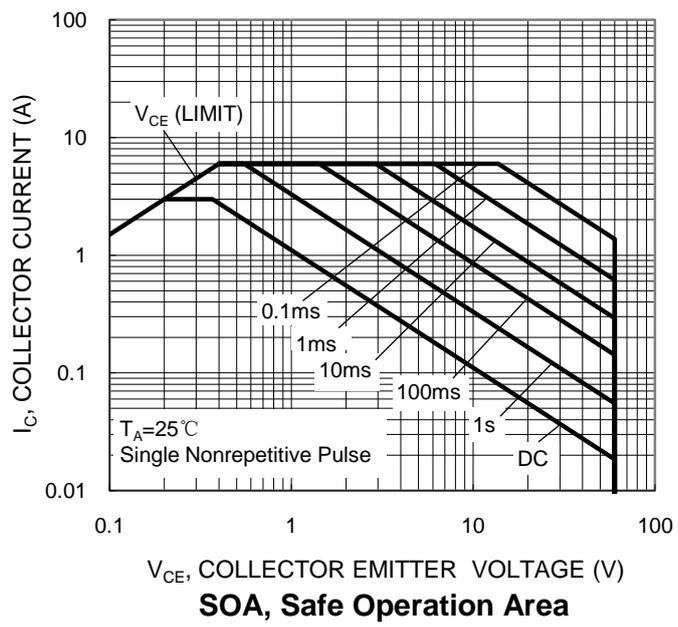
Characteristic	Symbol	Value	Unit	
Power Dissipation	P <sub>D</sub>	(Note 5)	0.9	W
		(Note 6)	2.1	W
		(Note 7)	3.1	W
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	(Note 5)	140	°C/W
		(Note 6)	65	°C/W
		(Note 7)	44	°C/W
Thermal Resistance, Junction to Leads (Note 8)	R <sub>θJL</sub>	8.5	°C/W	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +175	°C	

### ESD Ratings (Note 9)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
5. For a device mounted with the collector tab on MRP FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state.
  6. Same as Note 5, except the device is mounted on 25mm x 25mm 2oz copper.
  7. Same as Note 5, except the device is mounted on 50mm x 50mm 2oz copper.
  8. Thermal resistance from junction to solder-point (at the collector tab).
  9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

**Thermal Characteristics and Derating Information**

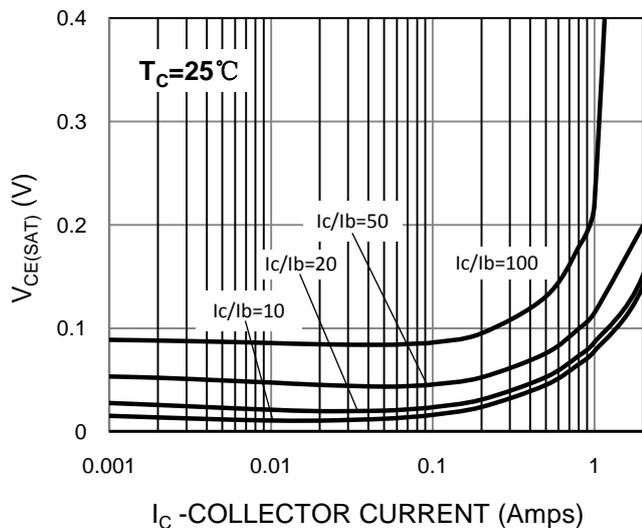


**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

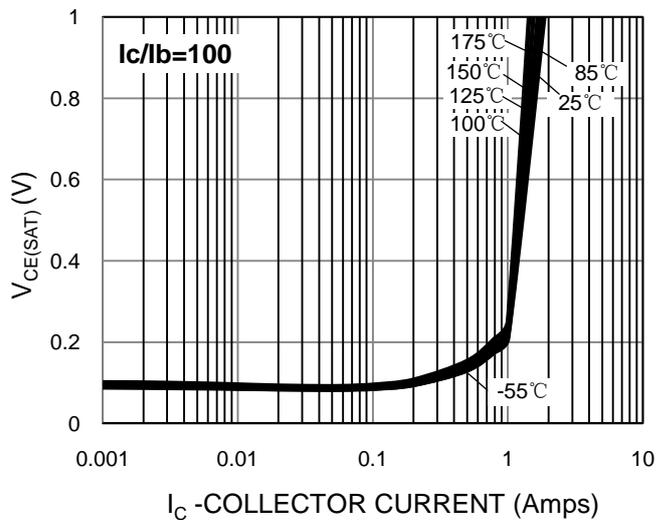
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	80	195	—	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage (Note 10)	BV <sub>CEO</sub>	60	80	—	V	I <sub>C</sub> = 10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	7	8.3	—	V	I <sub>E</sub> = 100μA
Collector Cut-Off Current	I <sub>CBO</sub>	—	—	20	nA	V <sub>CB</sub> = 60V
		—	—	10	μA	V <sub>CB</sub> = 60V, T <sub>A</sub> = +125°C
Emitter Cut-Off Current	I <sub>EBO</sub>	—	—	20	nA	V <sub>EB</sub> = 6V
Collector-Emitter Saturation Voltage (Note 10)	V <sub>CE(SAT)</sub>	—	78	250	mV	I <sub>C</sub> = 1A, I <sub>B</sub> = 100mA
		—	200	500		I <sub>C</sub> = 3A, I <sub>B</sub> = 300mA
Base-Emitter Saturation Voltage (Note 10)	V <sub>BE(SAT)</sub>	—	0.86	1.1	V	I <sub>C</sub> = 1A, I <sub>B</sub> = 100mA
Base-Emitter Turn-On Voltage (Note 10)	V <sub>BE(ON)</sub>	—	0.79	0.95	V	I <sub>C</sub> = 1A, V <sub>CE</sub> = 2V
DC Current Gain (Note 10)	h <sub>FE</sub>	70	152	—	—	I <sub>C</sub> = 50mA, V <sub>CE</sub> = 2V
		100	150	300		I <sub>C</sub> = 500mA, V <sub>CE</sub> = 2V
		80	147	—		I <sub>C</sub> = 1A, V <sub>CE</sub> = 2V
		40	117	—		I <sub>C</sub> = 2A, V <sub>CE</sub> = 2V
Current Gain-Bandwidth Product	f <sub>T</sub>	140	175	—	MHz	V <sub>CE</sub> = 5V, I <sub>C</sub> = 100mA, f = 100MHz
Switching Times	t <sub>ON</sub>	—	45	—	ns	I <sub>C</sub> = 500mA, V <sub>CC</sub> = 10V, I <sub>B1</sub> = - I <sub>B2</sub> = 50mA
	t <sub>OFF</sub>	—	800	—		
Output Capacitance	C <sub>OBO</sub>	—	—	30	pF	V <sub>CB</sub> = 10V, f = 1MHz

Note: 10. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

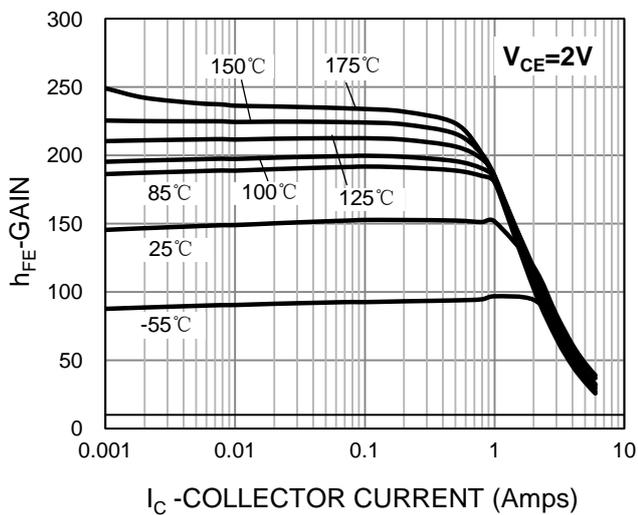
Typical Electrical Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)



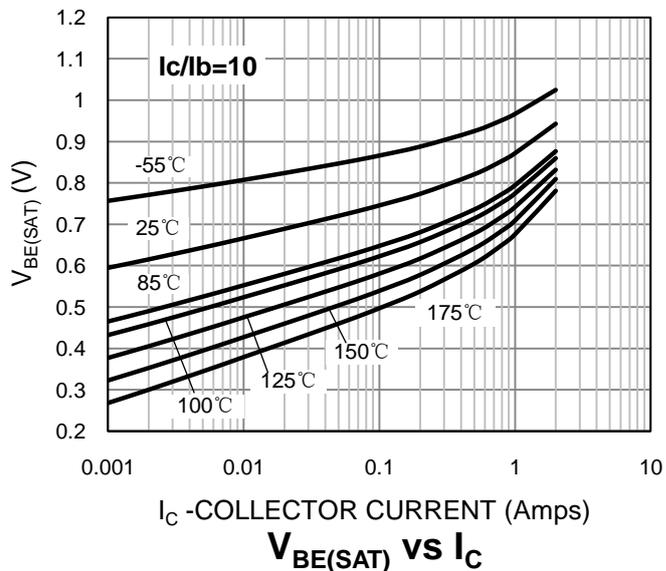
$V_{CE(SAT)}$  vs  $I_C$



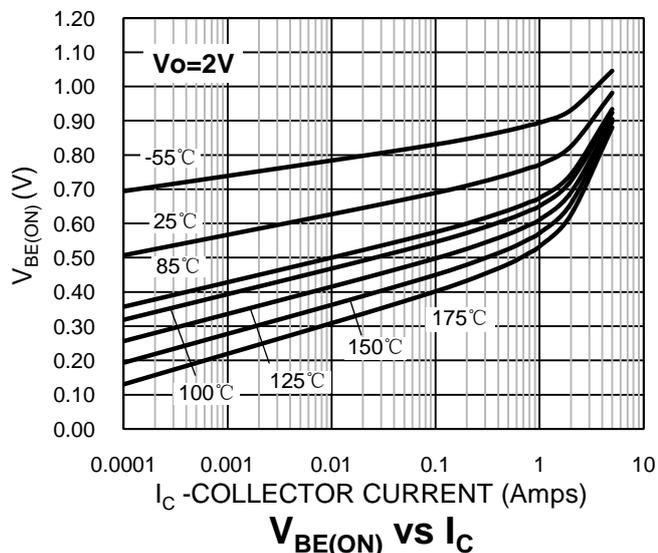
$V_{CE(SAT)}$  vs  $I_C$



$h_{FE}$  vs  $I_C$



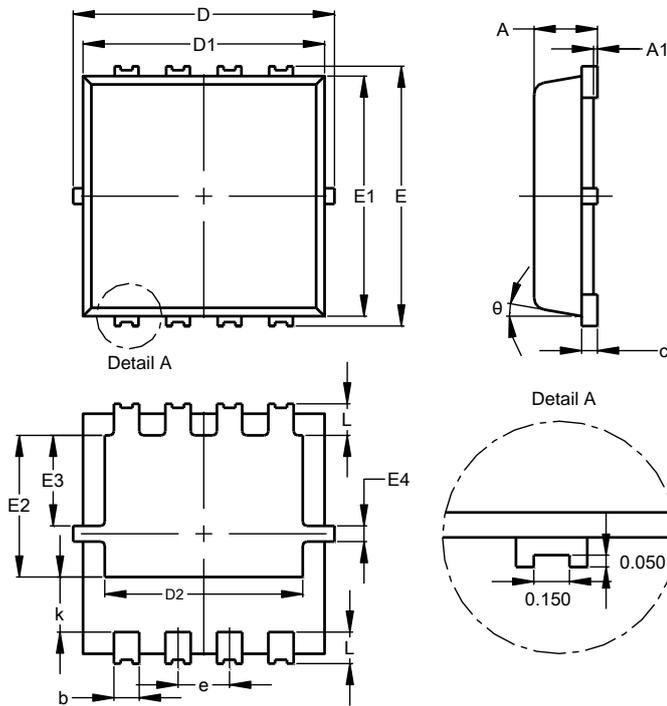
$V_{BE(SAT)}$  vs  $I_C$



$V_{BE(ON)}$  vs  $I_C$

### Package Outline Dimensions

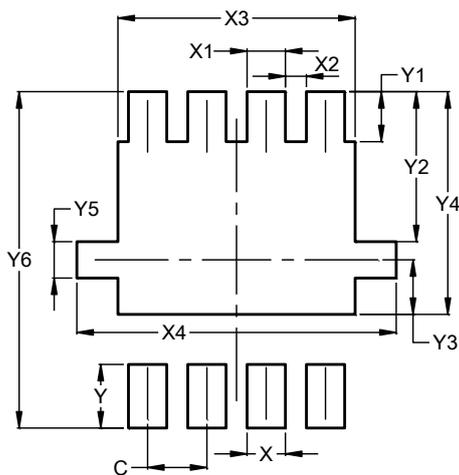
PowerDI3333-8 (SWP) (Type UX)



PowerDI3333-8 (SWP) (Type UX)			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	--
b	0.25	0.40	0.32
c	0.10	0.25	0.15
D	3.20	3.40	3.30
D1	2.95	3.15	3.05
D2	2.30	2.70	2.50
E	3.20	3.40	3.30
E1	2.95	3.15	3.05
E2	1.60	2.00	1.80
E3	0.95	1.35	1.15
E4	0.10	0.30	0.20
e	--	--	0.65
k	0.50	0.90	0.70
L	0.30	0.50	0.40
θ	0°	12°	10°
All Dimensions in mm			

### Suggested Pad Layout

PowerDI3333-8 (SWP) (Type UX)



Dimensions	Value (in mm)
C	0.650
X	0.420
X1	0.420
X2	0.230
X3	2.600
X4	3.500
Y	0.700
Y1	0.550
Y2	1.650
Y3	0.600
Y4	2.450
Y5	0.400
Y6	3.700

Note: For high voltage applications, the appropriate industry sector guidelines should be considered with regards to creepage and clearance distances between device terminals and PCB tracking.