优尚

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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Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D Max T_C = +25°C
60V	20.5mΩ @ V_{GS} = 10V	24.5A
	27mΩ @ V_{GS} = 4.5V	21.5A

Features and Benefits

- Rated to +175°C – Ideal for High Ambient Temperature Environments
- 100% Unclamped Inductive Switching (UIS) Test in Production – Ensures More Reliable and Robust End Application
- Low $R_{DS(ON)}$ – Ensures On-State Losses are Minimized
- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- ESD Protected Gate
- Wettable Flank for Improved Optical Inspection

Description and Applications

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

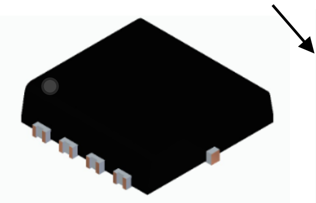
- Wireless Charging
- DC-DC Converters
- Power Management

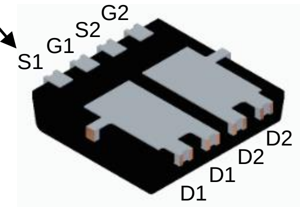
Mechanical Data

- Case: POWERDI®3333-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 ⓔ3
- Weight: 0.072 grams (Approximate)

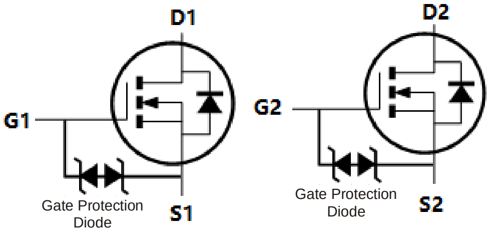
POWERDI3333-8/SWP (Type UXD)


ESD PROTECTED


Top View



Bottom View



Internal Schematic

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	60	V
Gate-Source Voltage			V_{GSS}	±16	V
Continuous Drain Current, V_{GS} = 10V (Note 6)		T_C = +25°C	I_D	24.5	A
		T_C = +100°C		17.4	
Continuous Drain Current, V_{GS} = 10V (Note 6)	Steady State	T_A = +25°C	I_D	9.2	A
		T_A = +100°C		6.5	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	98	A
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	3	A
Pulsed Body Diode Forward Current (10µs Pulse, Duty Cycle = 1%)			I_{SM}	98	A
Avalanche Current, L = 0.1mH			I_{AS}	20.4	A
Avalanche Energy, L = 0.1mH			E_{AS}	20.8	mJ

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	1.46	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	103	°C/W
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	3	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	50	°C/W
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	7	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +175	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	60	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS} = 48V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±10	µA	V_{GS} = ±16V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	1.3	—	2.5	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	15.6	20.5	mΩ	V_{GS} = 10V, I_D = 10A
		—	21	27		V_{GS} = 4.5V, I_D = 6A
Diode Forward Voltage	V_{SD}	—	0.7	1.2	V	V_{GS} = 0V, I_S = 1A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	825	—	pF	V_{DS} = 30V, V_{GS} = 0V, f = 1MHz
Output Capacitance	C_{oss}	—	244	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	20.5	—	pF	
Gate Resistance	R_g	—	1.5	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_g	—	7.1	—	nC	V_{DS} = 30V, I_D = 10A
Total Gate Charge (V_{GS} = 10V)	Q_g	—	14.3	—	nC	
Gate-Source Charge	Q_{gs}	—	2.1	—	nC	
Gate-Drain Charge	Q_{gd}	—	2.8	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	4.0	—	ns	V_{GS} = 10V, V_{DS} = 30V, R_g = 6Ω, I_D = 10A
Turn-On Rise Time	t_R	—	5.3	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	18.5	—	ns	
Turn-Off Fall Time	t_F	—	8.0	—	ns	
Body Diode Reverse Recovery Time	t_{RR}	—	22.7	—	ns	I_F = 6A, di/dt = 100A/µs
Body Diode Reverse Recovery Charge	Q_{RR}	—	12.8	—	nC	

Notes:
5. Device mounted on FR-4 PCB, with minimum recommended pad layout, single sided.
6. Device mounted on FR-4 substrate PCB, 2oz copper, with thermal bias to bottom layer 1inch square copper plate.
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

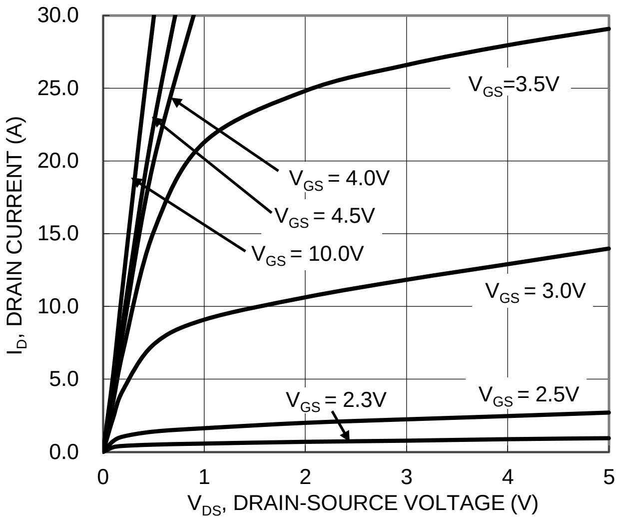


Figure 1.Typical Output Characteristic

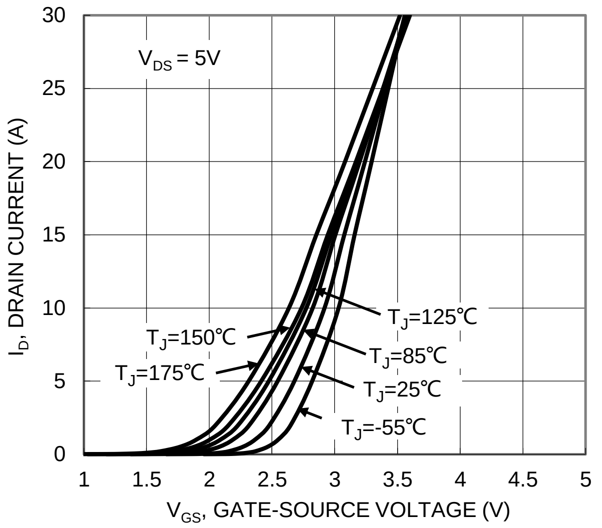


Figure 2. Typical Transfer Characteristic

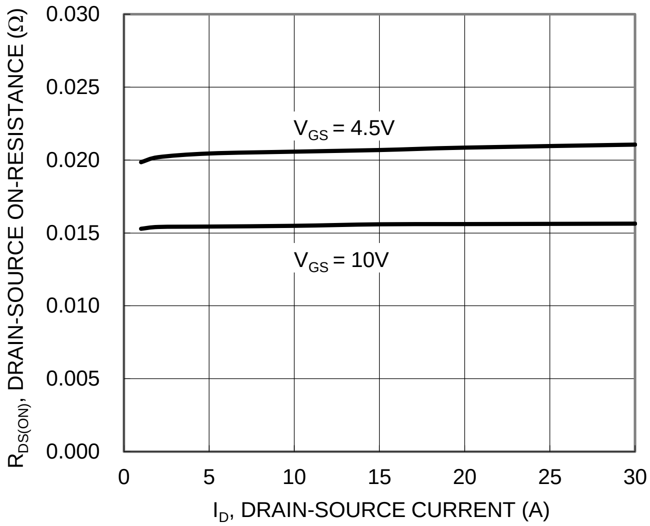


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

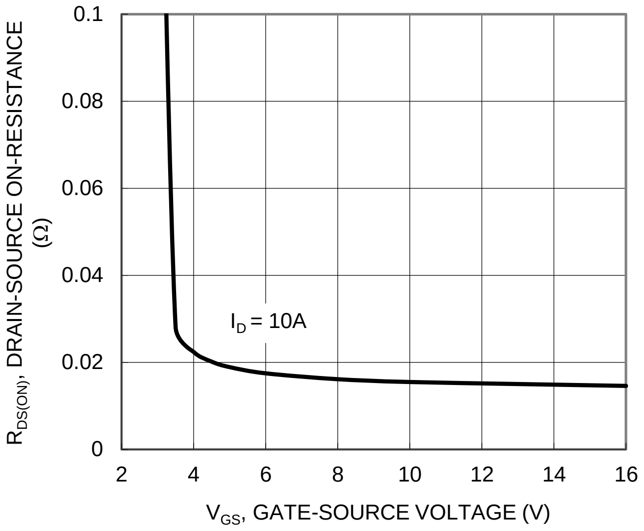


Figure 4. Typical Transfer Characteristic

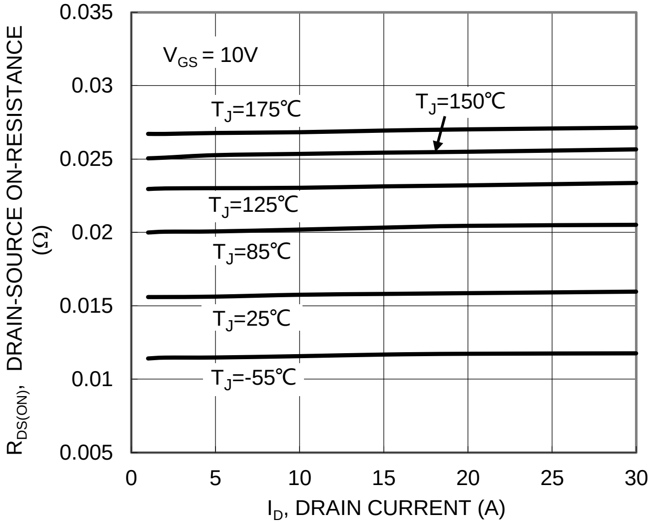


Figure 5. Typical On-Resistance vs. Drain Current and Temperature

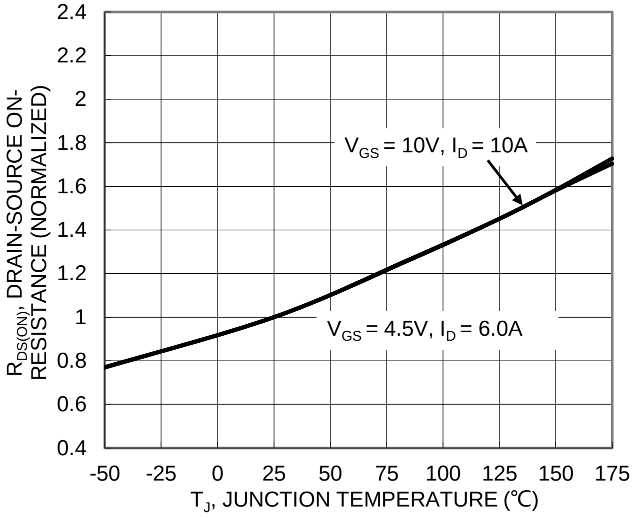


Figure 6. On-Resistance Variation with Temperature

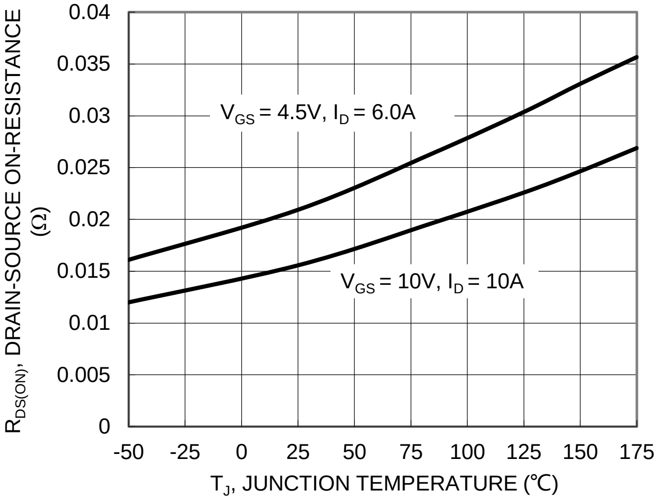


Figure 7. On-Resistance Variation with Temperature

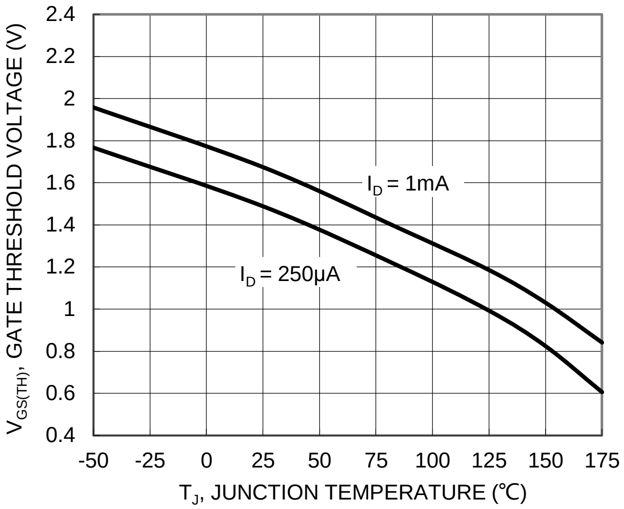


Figure 8. Gate Threshold Variation vs. Junction Temperature

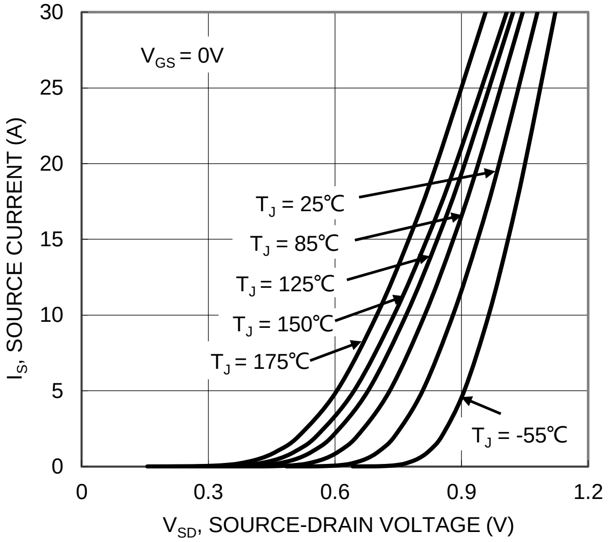


Figure 9. Diode Forward Voltage vs. Current

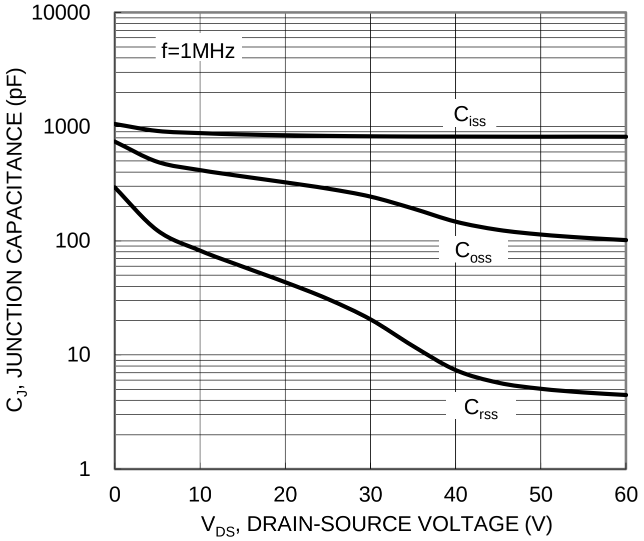


Figure 10. Typical Junction Capacitance

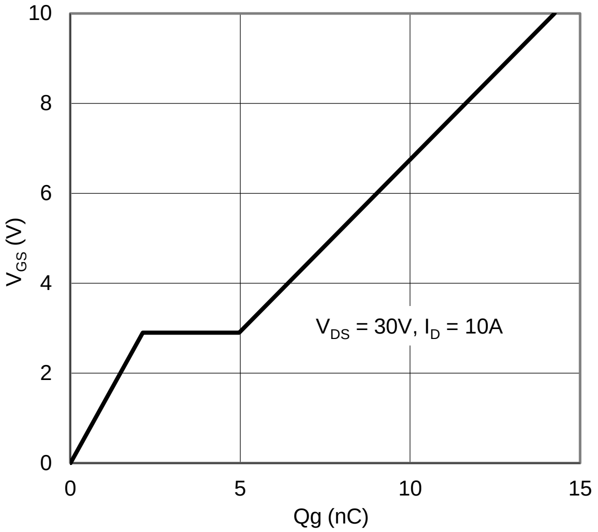


Figure 11. Gate Charge

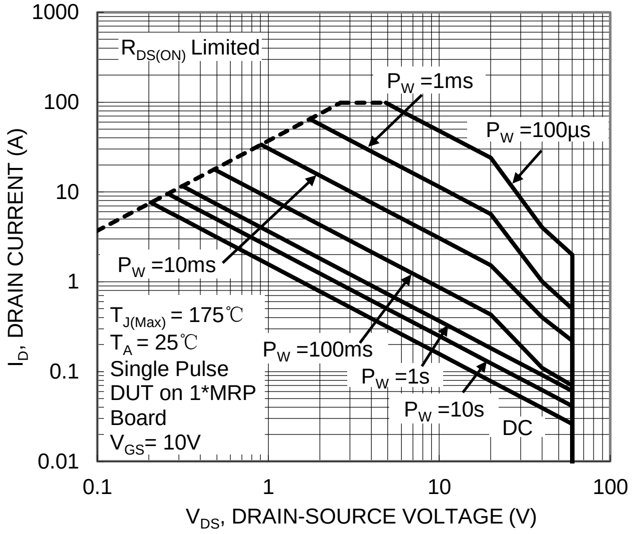


Figure 12. SOA, Safe Operation Area

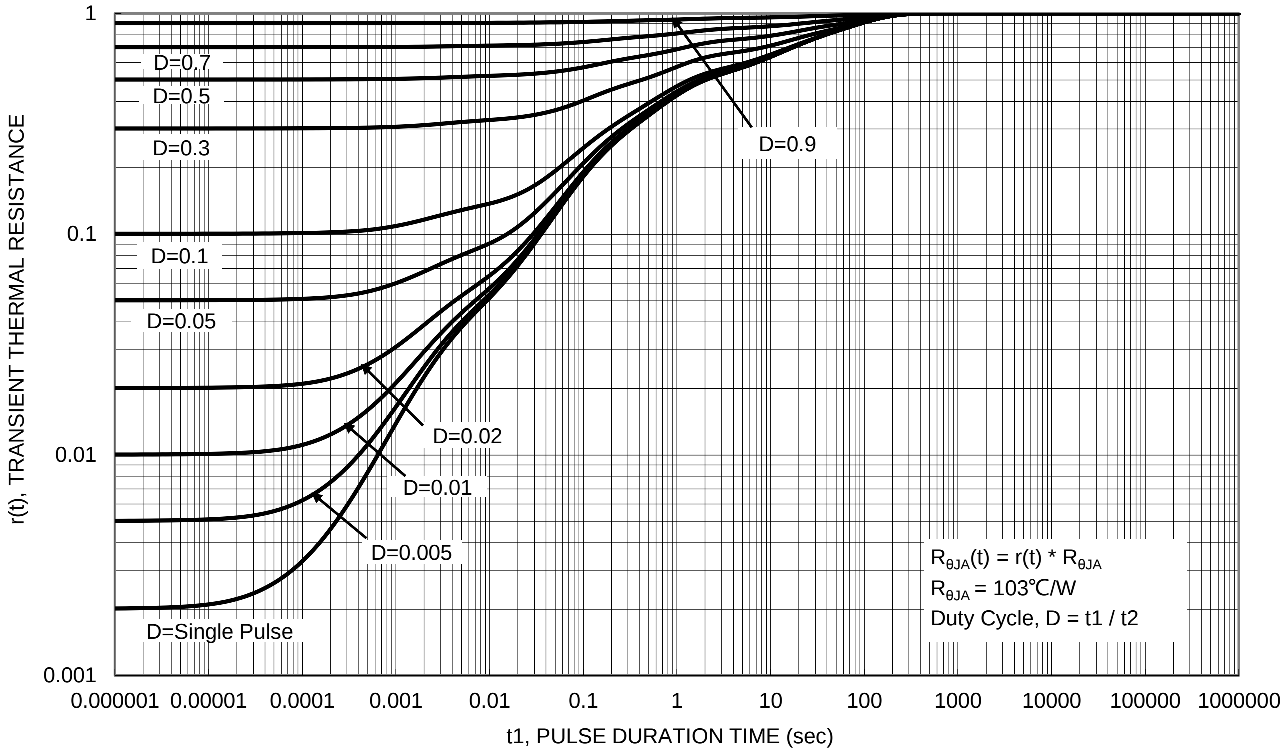
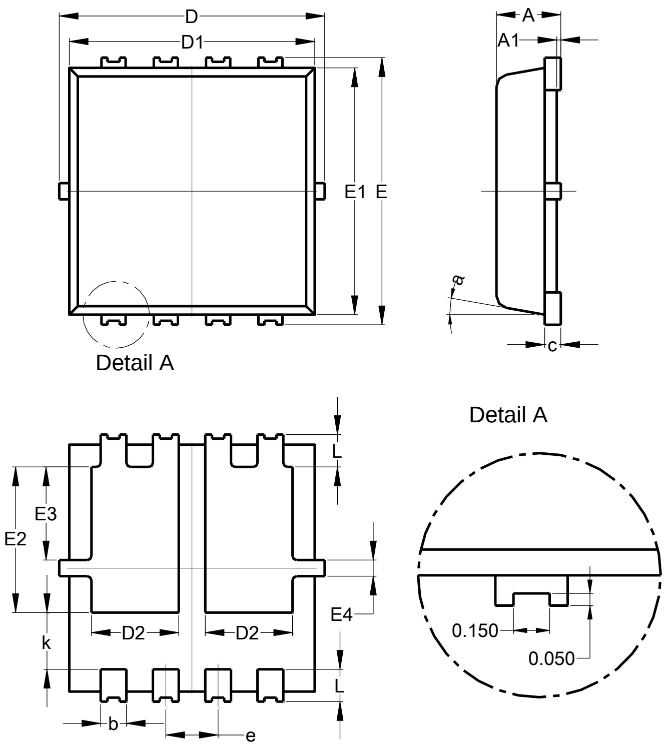


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

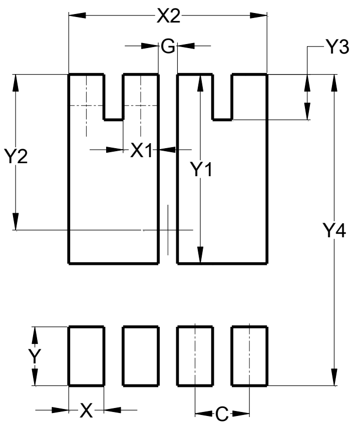
POWERDI®3333-8/SWP (Type UXD)



POWERDI®3333-8/SWP (Type UXD)			
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	1.00	1.20	1.10
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
L	0.30	0.50	0.40
k	0.50	0.90	0.70
a	0°	12°	10°
All Dimensions in mm			

Suggested Pad Layout

POWERDI®3333-8/SWP (Type UXD)



Dimensions	Value (in mm)
C	0.650
G	0.230
X	0.420
X1	0.420
X2	2.370
Y	0.700
Y1	2.250
Y2	1.850
Y3	0.540
Y4	3.700