



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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企业微信二维码



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## Product Summary

BV <sub>bss</sub>	R <sub>DS(ON)</sub> Max	I <sub>D</sub> Max T <sub>C</sub> = +25°C
65V	5.4mΩ @ V <sub>GS</sub> = 10V	67.8A
	7.3mΩ @ V <sub>GS</sub> = 4.5V	59.6A

## Features and Benefits

- 100% Unclamped Inductive Switching (UIS) Test in Production – Ensures More Reliable and Robust End Application
- High Conversion Efficiency
- Low R<sub>DS(ON)</sub> – Minimizes On State Losses
- Low Input Capacitance
- Fast Switching Speed

## Description and Applications

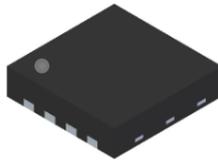
This new generation N-Channel Enhancement Mode MOSFET is designed to minimize R<sub>DS(ON)</sub> yet maintain superior switching performance. This device is ideal for use in notebook battery power management and load switch.

- Synchronous Rectifier
- Power Management Functions
- DC-DC Converters

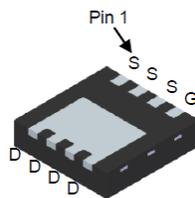
## Mechanical Data

- Case: V-DFN3333-8
- 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 Below Diagram
- Terminals: Finish—NiPdAu over Copper Leadframe. Solderable per MIL-STD-202, Method 208 (e4)
- Weight: 0.027 grams (Approximate)

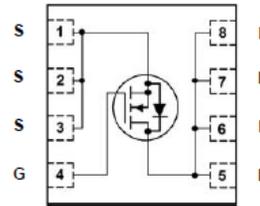
V-DFN3333-8 (Type B)



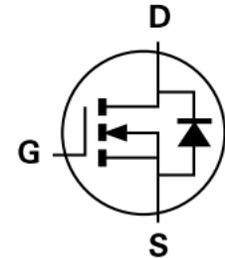
Top View



Bottom View



Top View  
Internal Schematic



Equivalent Circuit

**Maximum Ratings** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			$V_{DSS}$	65	V
Gate-Source Voltage			$V_{GSS}$	$\pm 20$	V
Continuous Drain Current, $V_{GS} = 10\text{V}$ (Note 6)	Steady State	$T_A = +25^\circ\text{C}$	$I_D$	16.7	A
		$T_A = +70^\circ\text{C}$		13.4	
Continuous Drain Current, $V_{GS} = 10\text{V}$ (Note 7)		$T_C = +25^\circ\text{C}$	$I_D$	67.8	A
		$T_C = +70^\circ\text{C}$		54.2	
Pulsed Drain Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)			$I_{DM}$	260	A
Maximum Continuous Body Diode Forward Current (Note 7)			$I_S$	65	A
Pulsed Body Diode Forward Current (10 $\mu\text{s}$ Pulse, Duty Cycle = 1%)			$I_{SM}$	260	A
Avalanche Current, $L = 1\text{mH}$			$I_{AS}$	20.3	A
Avalanche Energy, $L = 1\text{mH}$			$E_{AS}$	206	mJ
$V_{DS}$ Spike		$t = 10\mu\text{s}$	$V_{SPIKE}$	65	V

**Thermal Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	$T_A = +25^\circ\text{C}$	$P_D$	1.2	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	101	$^\circ\text{C/W}$
Total Power Dissipation (Note 6)	$T_A = +25^\circ\text{C}$	$P_D$	2.6	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	49	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case (Note 7)		$R_{\theta JC}$	3.0	$^\circ\text{C/W}$
Operating and Storage Temperature Range		$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	65	—	—	V	$V_{GS} = 0\text{V}, I_D = 10\text{mA}$
Zero Gate Voltage Drain Current	$I_{DSS}$	—	—	1	$\mu\text{A}$	$V_{DS} = 52\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	—	—	$\pm 100$	nA	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	1.3	—	2.5	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	4.1	5.4	m $\Omega$	$V_{GS} = 10\text{V}, I_D = 20\text{A}$
		—	5.5	7.3		$V_{GS} = 4.5\text{V}, I_D = 18\text{A}$
Diode Forward Voltage	$V_{SD}$	—	0.7	1.2	V	$V_{GS} = 0\text{V}, I_S = 1\text{A}$
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	$C_{iss}$	—	2626	—	pF	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Output Capacitance	$C_{oss}$	—	905	—		
Reverse Transfer Capacitance	$C_{rss}$	—	91	—		
Gate Resistance	$R_g$	—	1.21	—	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge ( $V_{GS} = 10\text{V}$ )	$Q_g$	—	51.4	—	nC	$V_{DS} = 30\text{V}, I_D = 30\text{A}$
Total Gate Charge ( $V_{GS} = 4.5\text{V}$ )	$Q_g$	—	28.9	—		
Gate-Source Charge	$Q_{gs}$	—	8.2	—		
Gate-Drain Charge	$Q_{gd}$	—	14.4	—		
Turn-On Delay Time	$t_{d(ON)}$	—	11.5	—	ns	$V_{DD} = 30\text{V}, V_{GS} = 10\text{V}, I_D = 30\text{A}, R_g = 3.3\Omega$
Turn-On Rise Time	$t_r$	—	7.8	—		
Turn-Off Delay Time	$t_{d(OFF)}$	—	35.1	—		
Turn-Off Fall Time	$t_f$	—	19.9	—		
Reverse Recovery Time	$t_{RR}$	—	44.8	—	ns	$I_F = 30\text{A}, di/dt = 100\text{A}/\mu\text{s}$
Reverse Recovery Charge	$Q_{RR}$	—	54.0	—	nC	

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  - Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  - Thermal resistance from junction to soldering point (on the exposed drain pad).
  - Short duration pulse test used to minimize self-heating effect.
  - Guaranteed by design. Not subject to product testing.

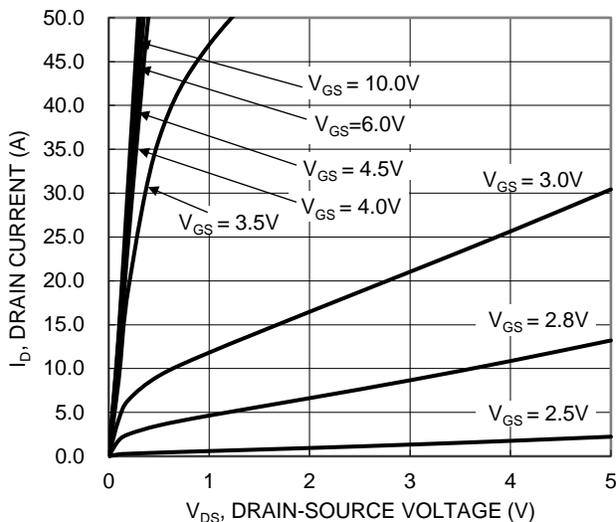


Figure 1. Typical Output Characteristic

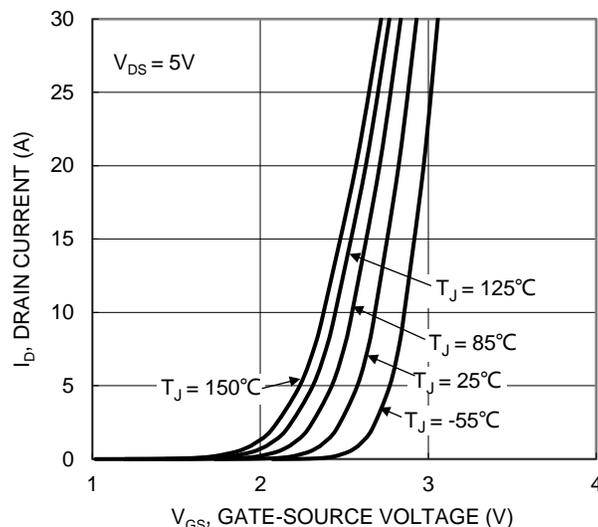


Figure 2. Typical Transfer Characteristic

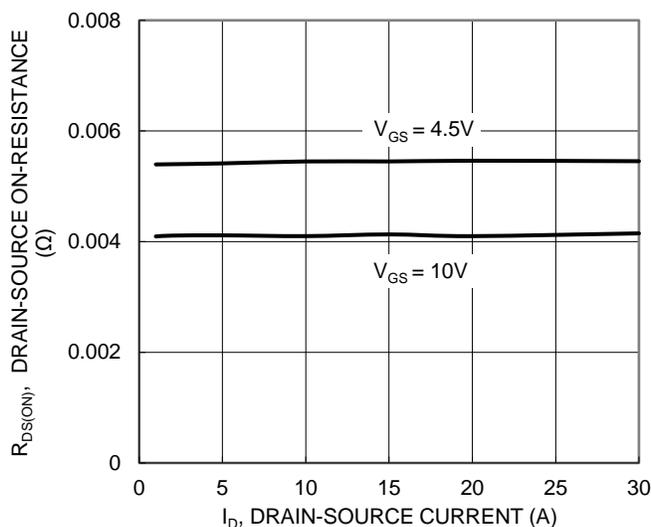


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

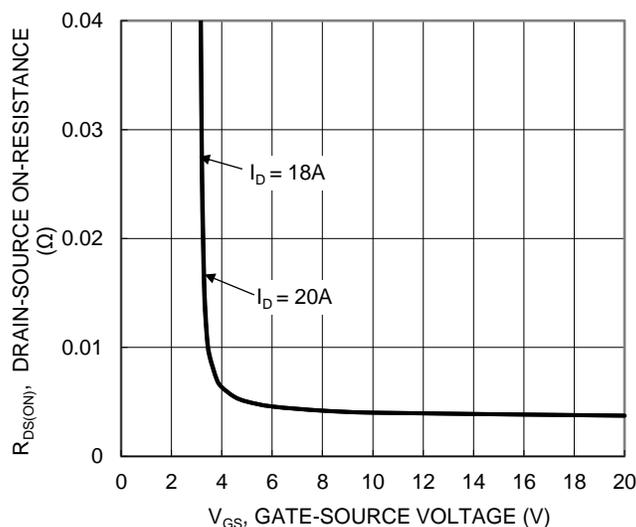


Figure 4. Typical Transfer Characteristic

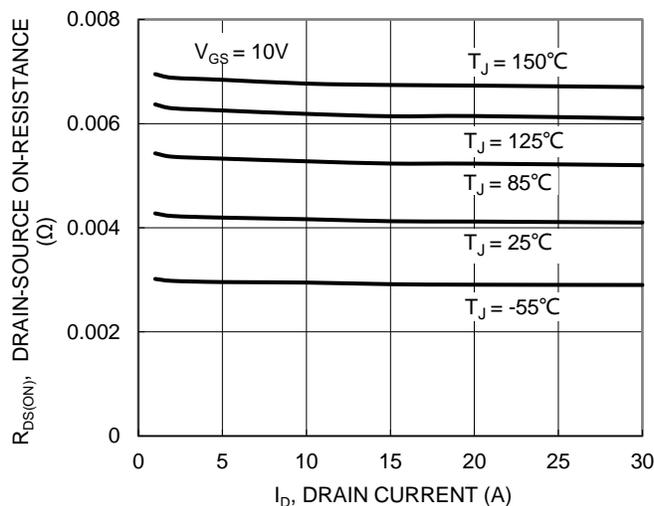


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

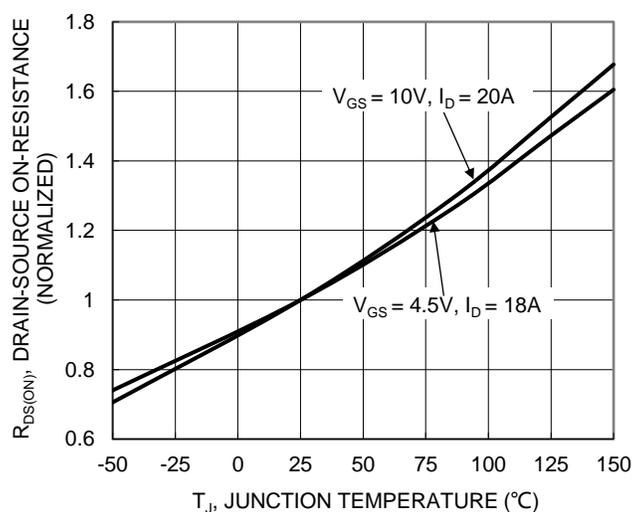


Figure 6. On-Resistance Variation with Junction Temperature

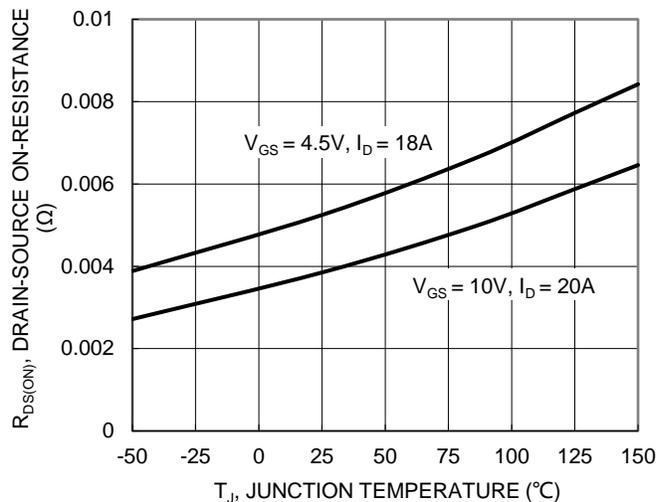


Figure 7. On-Resistance Variation with Junction Temperature

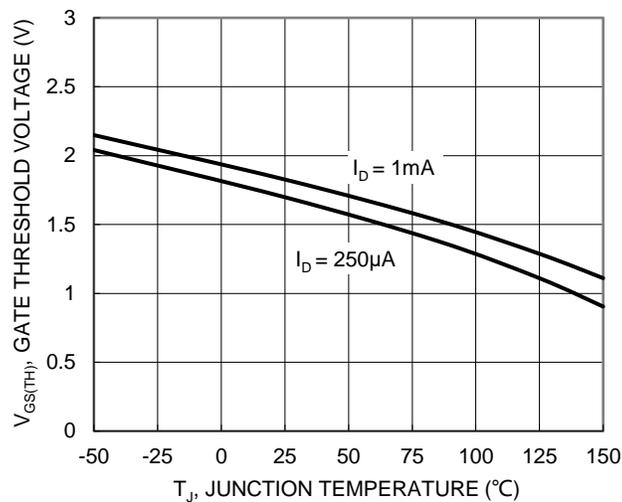


Figure 8. Gate Threshold Variation vs. Junction Temperature

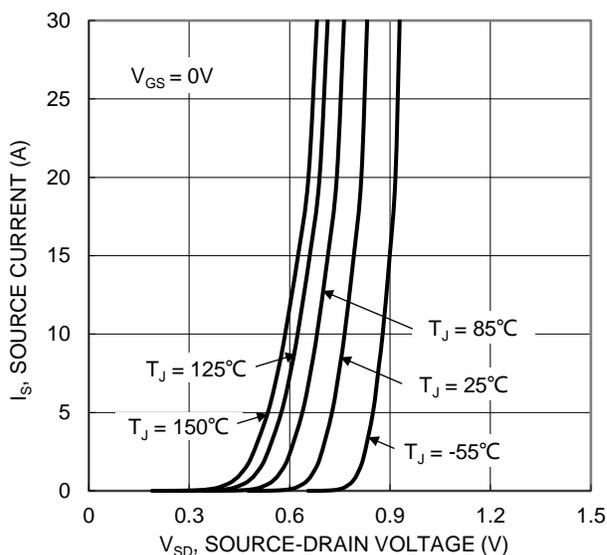


Figure 9. Diode Forward Voltage vs. Current

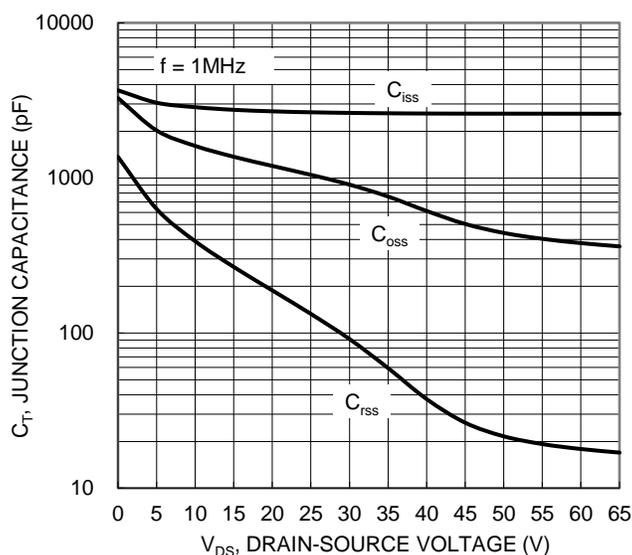


Figure 10. Typical Junction Capacitance

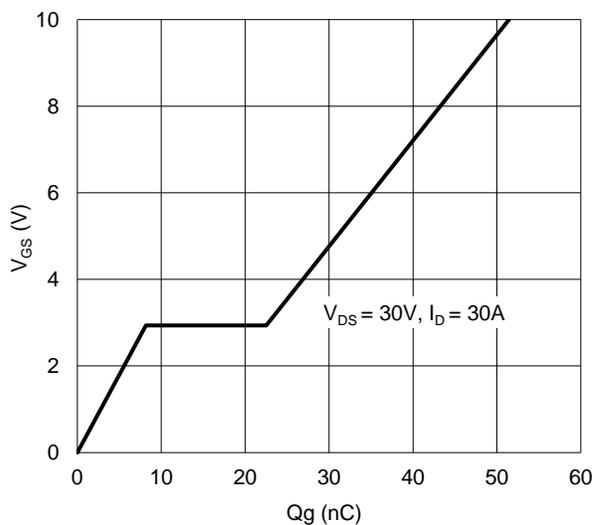


Figure 11. Gate Charge

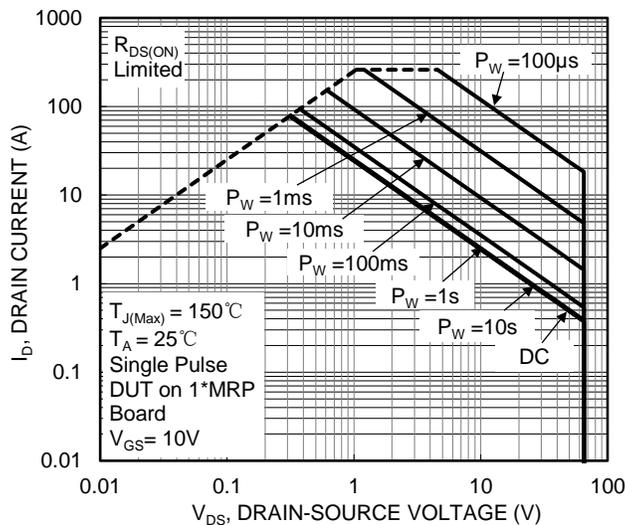


Figure 12. SOA, Safe Operation Area

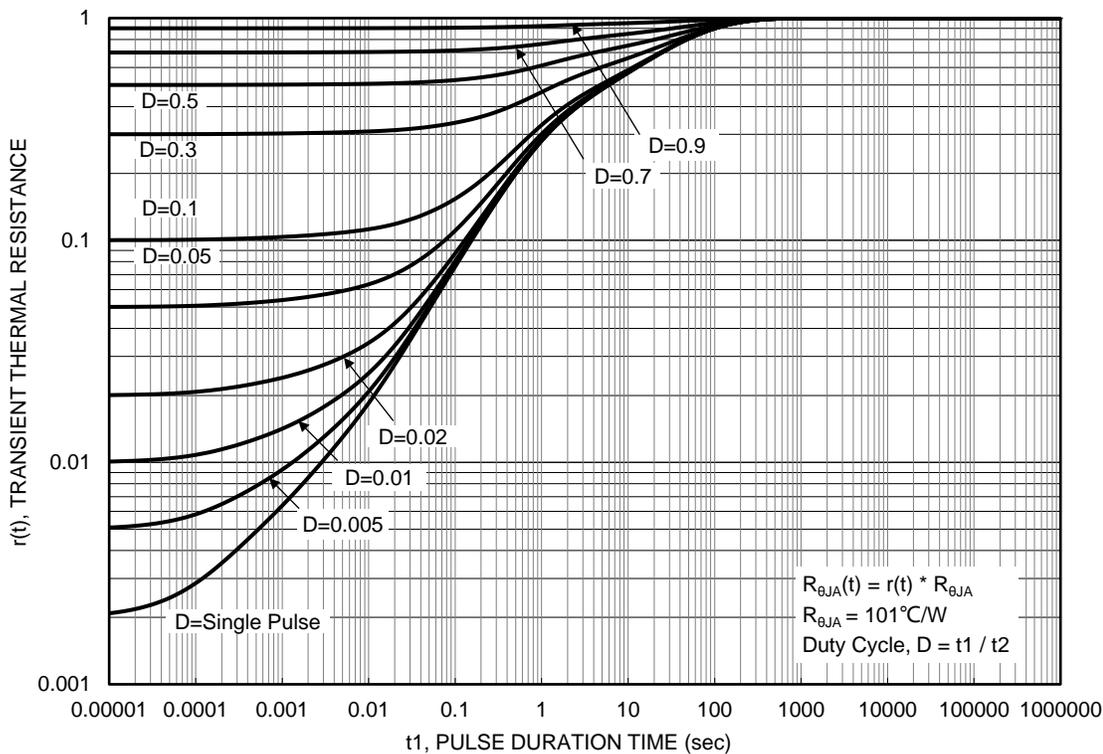
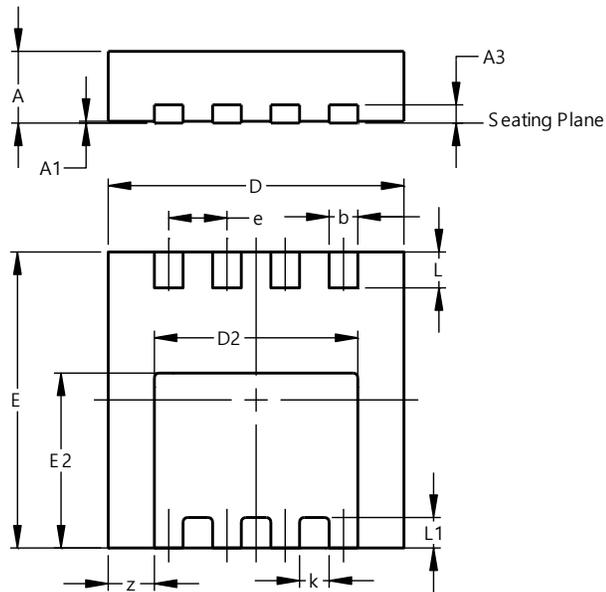


Figure 13. Transient Thermal Resistance

## Package Outline Dimensions

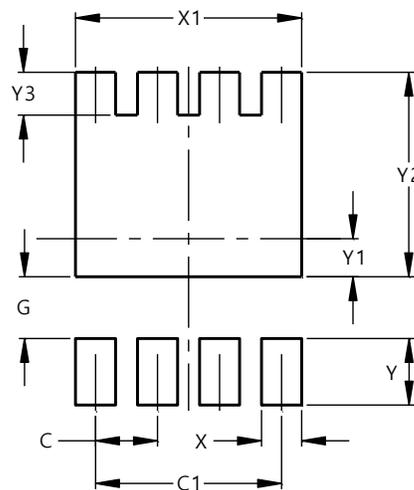
V-DFN3333-8 (Type B)



V-DFN3333-8 (Type B)			
Dim	Min	Max	Typ
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	--	--	0.203
b	0.27	0.37	0.32
D	3.25	3.35	3.30
D2	2.17	2.37	2.27
E	3.25	3.35	3.30
E2	1.85	2.05	1.95
e	--	--	0.65
k	--	--	0.33
L	0.35	0.45	0.40
L1	--	--	0.34
z	--	--	0.515
All Dimensions in mm			

## Suggested Pad Layout

V-DFN3333-8 (Type B)



Dimensions	Value (in mm)
C	0.650
C1	1.950
G	0.650
X	0.420
X1	2.370
Y	0.700
Y1	0.400
Y2	2.150
Y3	0.450