

## Description

The PSM8PN04R5 uses split gate trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. This device is suitable for power management and high efficiency applications at high switching frequencies applications.

### MOSFET Product Summary

$V_{DS}(V)$	$R_{DS(on)}(m\Omega)(Typ)$	$I_D(A)$
40	3.9@ $V_{GS} = 10V$	64
	5.7@ $V_{GS} = 4.5V$	

## Feature

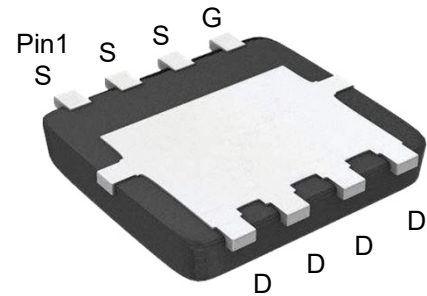
- Low  $R_{DS(ON)}$  - Ensures On-State Losses are Minimized
- Excellent  $Q_{gd} \times R_{DS(ON)}$  Product(FOM)
- Advanced Technology for DC-DC Converts
- Small Form Factor Thermally Efficient Package Enables Higher Density End Products
- 100% UIS (Avalanche) Rated
- Lead-Free Finish ; RoHS Compliant
- Halogen and Antimony Free. "Green" Device

## Applications

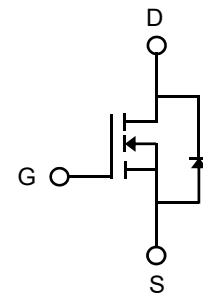
- PWM applications
- Load switch
- Power management
- DC-DC Converters
- Wireless Chargers

## Absolute maximum rating@25°C

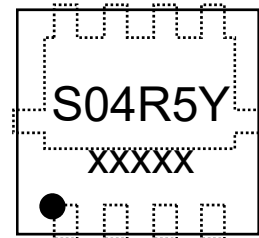
Rating	Symbol	Value	Units
Drain-Source Voltage	$V_{DS}$	40	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous <sup>1)</sup>	$I_D$	$T_C=25^\circ C$	64
		$T_C=100^\circ C$	40
Pulsed Drain Current <sup>2)</sup>	$I_{DM}$	213	A
Total Power Dissipation <sup>4)</sup>	$P_D$	$T_C=25^\circ C$	32
		$T_C=100^\circ C$	13
Avalanche Current @ $L=0.1mH$	$I_{AS}$	27	A
Avalanche Energy @ $L=0.1mH$	$E_{AS}$	36	mJ
Thermal Resistance , Junction-to-Case <sup>4)</sup>	$R_{\theta JC}$	3.9	$^\circ C/W$
Thermal Resistance Junction-to-Ambient <sup>3)</sup>	$R_{\theta JA}$	63	$^\circ C/W$
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55~+150	$^\circ C$



PDFN3333-8L  
(Bottom View)



Circuit Diagram



Pin1  
Marking (Top View)

## Electrical characteristics per line@25°C (unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units	
<b>Off Characteristics</b>							
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	40	-	-	V	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 40V,$ $V_{GS} = 0V$	$T_J = 25^\circ C$	-	-	1.0	$\mu A$
			$T_J = 55^\circ C$	-	-	10	
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	$\pm 100$	nA	
<b>On Characteristics<sup>5)</sup></b>							
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.2	1.7	2.5	V	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 20A$	-	3.9	4.7	m $\Omega$	
		$V_{GS} = 4.5V, I_D = 15A$	-	5.7	7.2		
Forward Transconductance	$g_{fs}$	$V_{DS} = 5V, I_D = 20A$	-	25	-	S	
Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0V, I_S = 2A$	-	0.7	1.2	V	
<b>Dynamic Characteristics<sup>6)</sup></b>							
Input Capacitance	$C_{iss}$	$V_{DS} = 20V, V_{GS} = 0V,$ $f = 1.0MHz$	-	994	-	pF	
Output Capacitance	$C_{oss}$		-	602	-		
Reverse Transfer Capacitance	$C_{rss}$		-	23	-		
<b>Switching Characteristics<sup>6)</sup></b>							
Turn-on Delay Time	$t_{d(on)}$	$V_{DS} = 20V, V_{GS} = 10V,$ $R_G = 3\Omega, I_D = 20A$	-	1.3	-	ns	
Turn-on Rise Time	$t_r$		-	12	-		
Turn-Off Delay Time	$t_{d(off)}$		-	17	-		
Turn-Off Fall Time	$t_f$		-	12	-		
Total Gate Charge	$Q_g$	$V_{DS} = 20V, I_D = 20A,$ $V_{GS} = 0 \text{ to } 10V,$	-	14.3	-	nC	
Gate-Source Charge	$Q_{gs}$		-	3.1	-		
Gate-Drain Charge	$Q_{gd}$		-	1.8	-		
Gate Resistance	$R_g$	$V_{GS} = 0V, V_{DS} = 0V, f = 1MHz$	-	4.1	-	$\Omega$	
<b>Drain-Source Diode Characteristics<sup>6)</sup></b>							
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = 20A, d_i/d_t = 100A/\mu s$	-	30	-	ns	
Body Diode Reverse Recovery Charge	$Q_{rr}$		-	11	-	nC	
Diode Forward Current	$I_S$	-	-	-	64	A	

## Notes:

- Pulse width limited by maximum junction temperature.
- Pulse test : Pulse width  $\leq 100\mu s$ , duty cycle  $\leq 2\%$ .
- Device mounted on 1 inch FR4 PCB with 2oz.Copper.
- Device mounted on infinite heatsink.
- Measured under pulsed conditions. Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production.

## Typical Characteristics

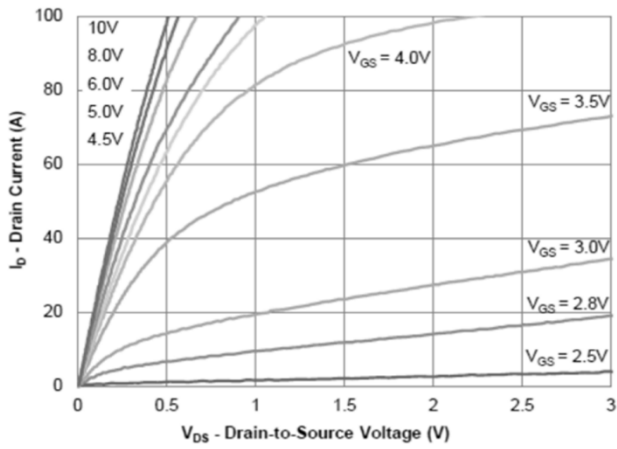


Figure 1: Output Characteristics

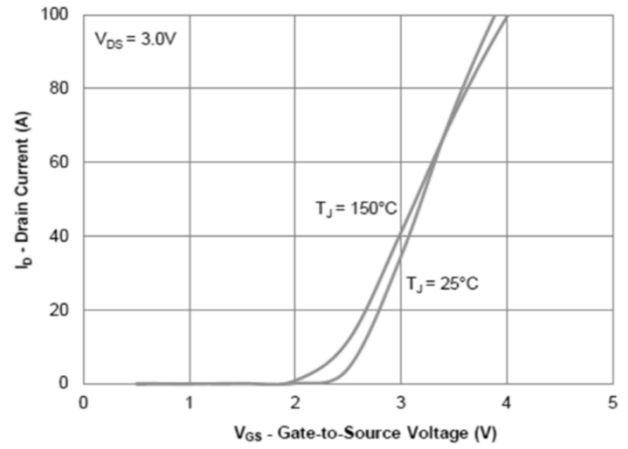


Figure 2: Transfer Characteristics

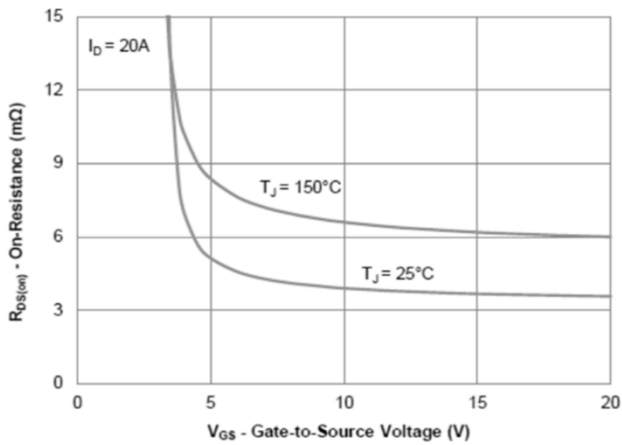


Figure 3: On-Resistance vs. Gate-Source Voltage

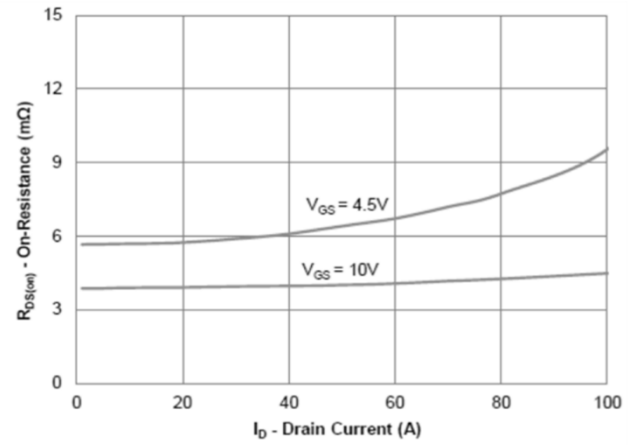


Figure 4: On-Resistance vs. Drain Current

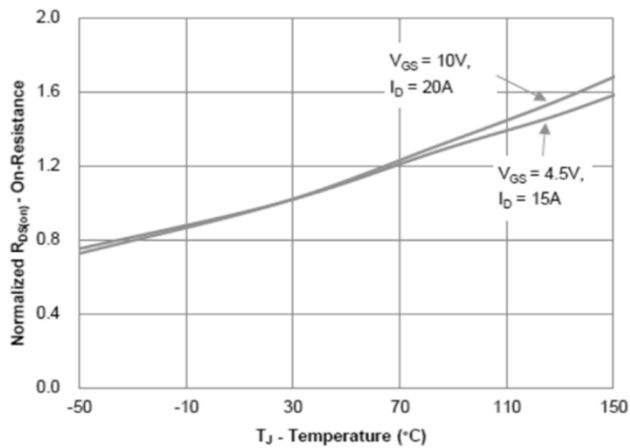


Figure 5: On-Resistance vs. Junction Temperature

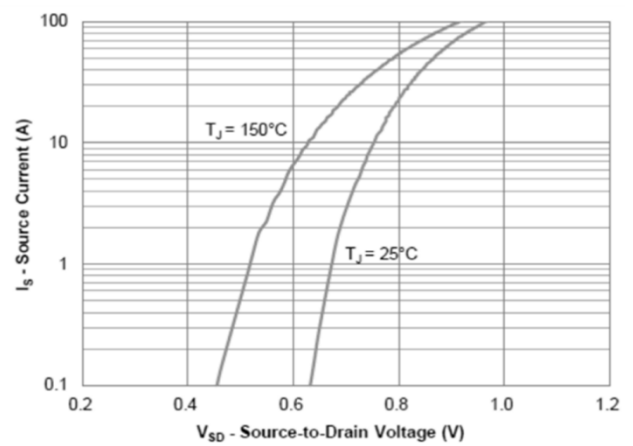


Figure 6: Source-Drain Diode Forward Voltage

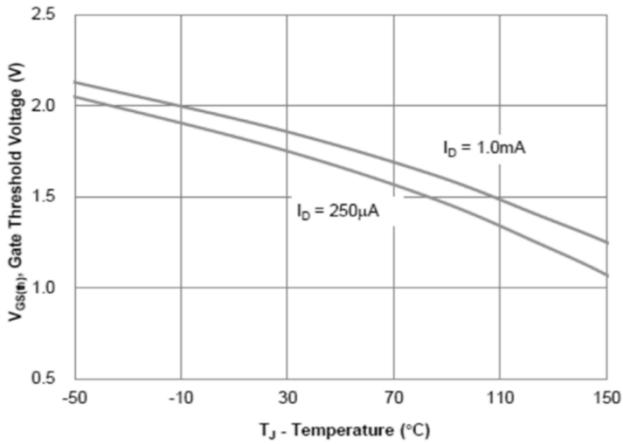


Figure 7: Gate Threshold Variation vs. Junction Temperature

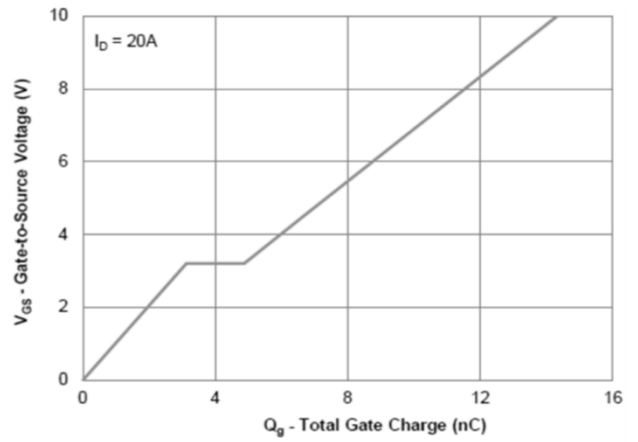


Figure 8: Gate Charge Characteristics

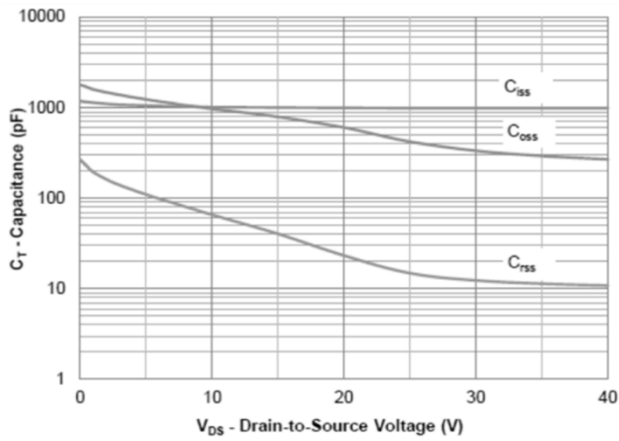


Figure 9: Capacitance Characteristics

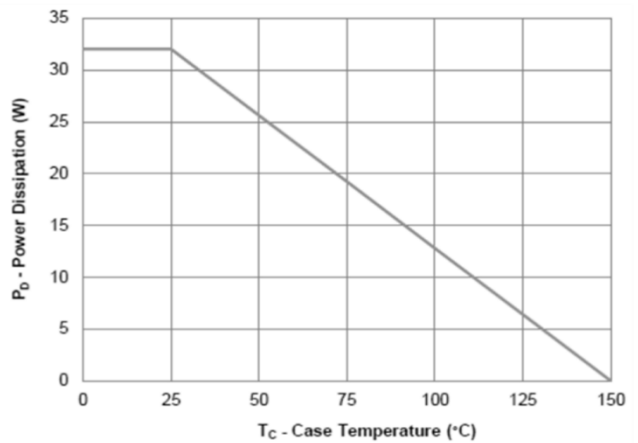


Figure 10: Power Derating

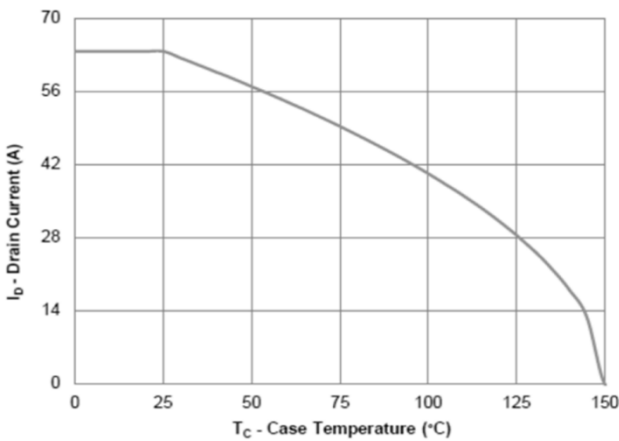


Figure 11: Current Derating

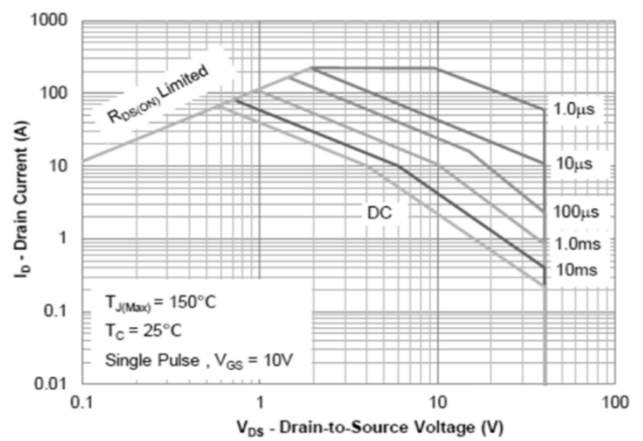


Figure 12: Safe Operating Area

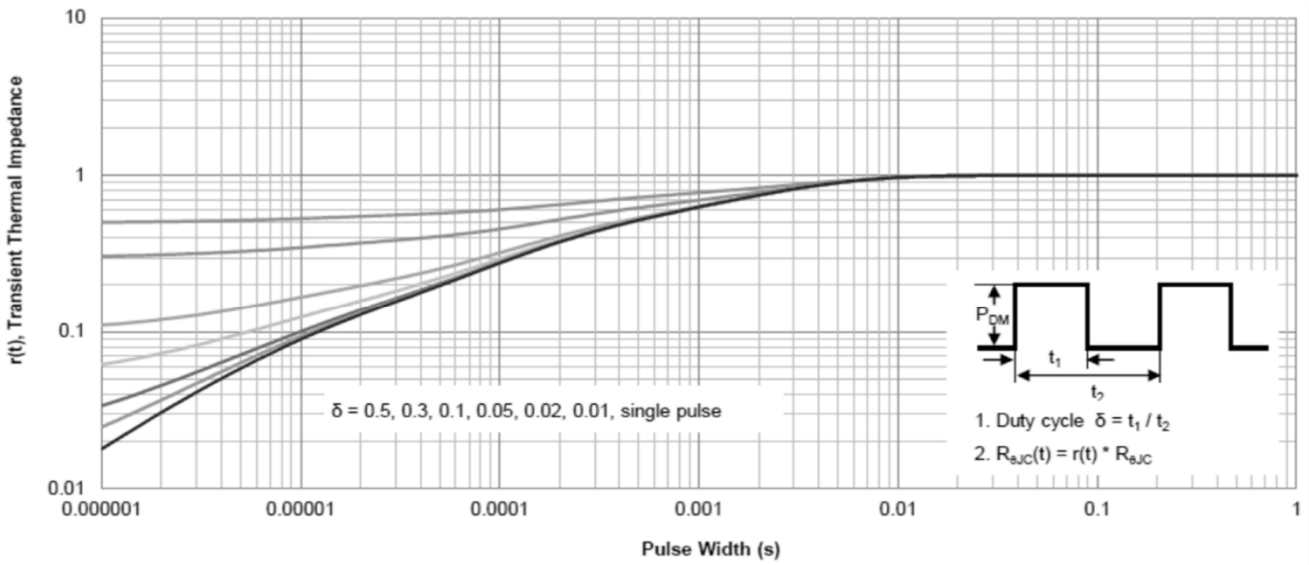
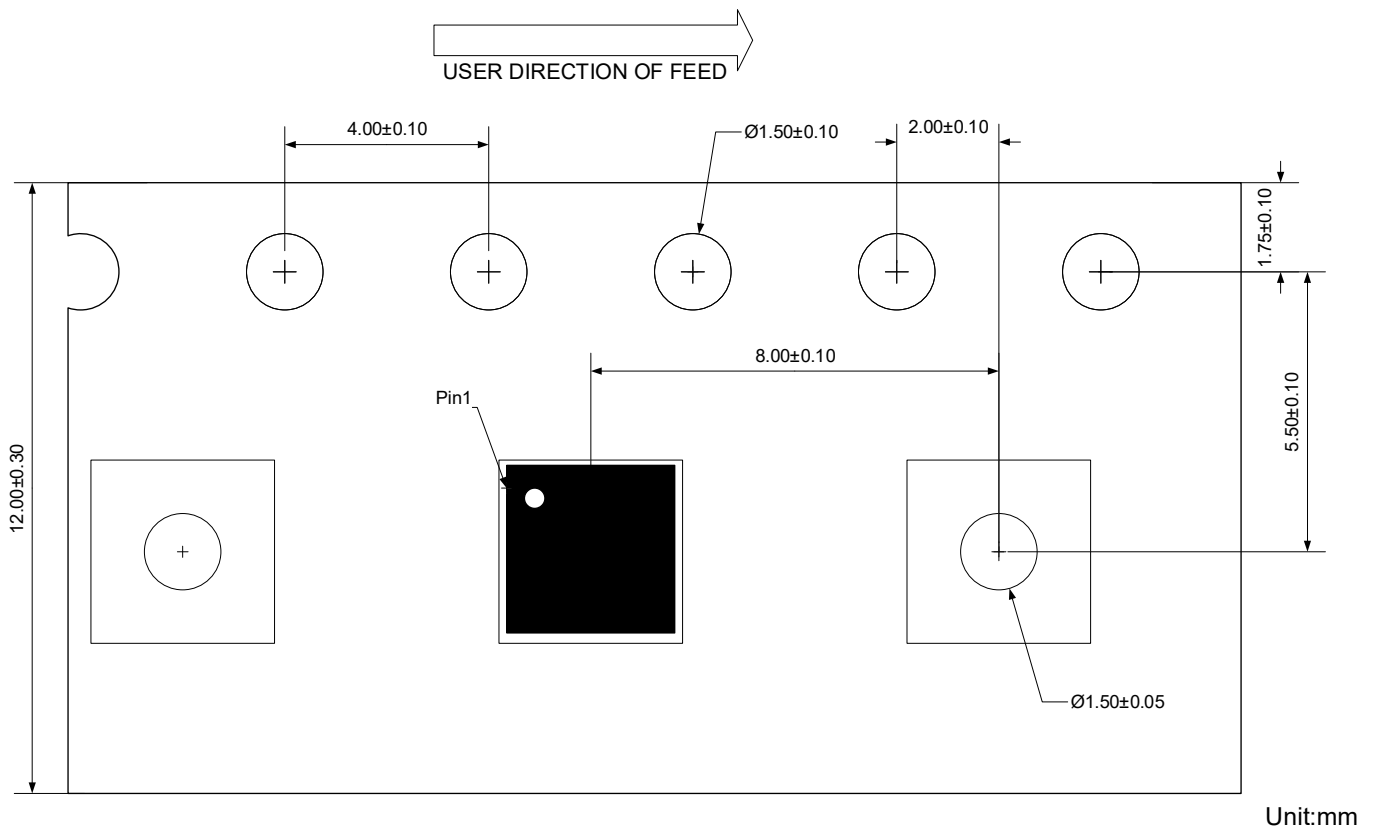


Figure 13: Normalized Maximum Transient Thermal Impedance

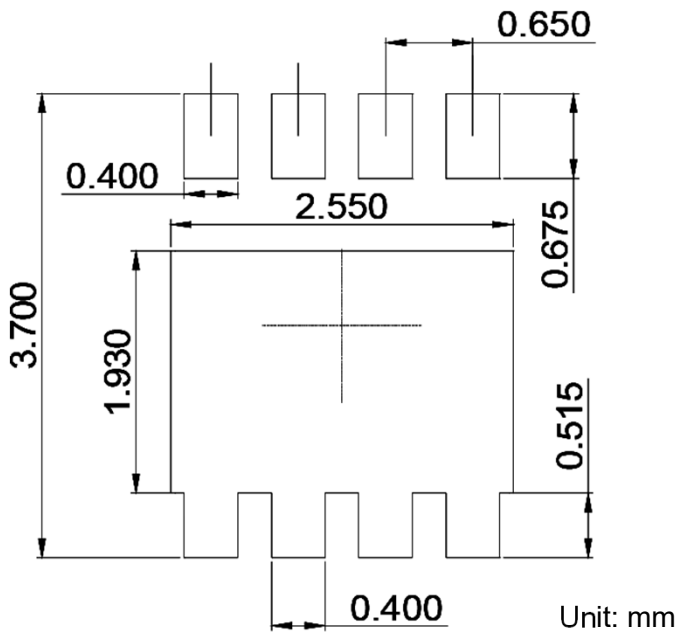
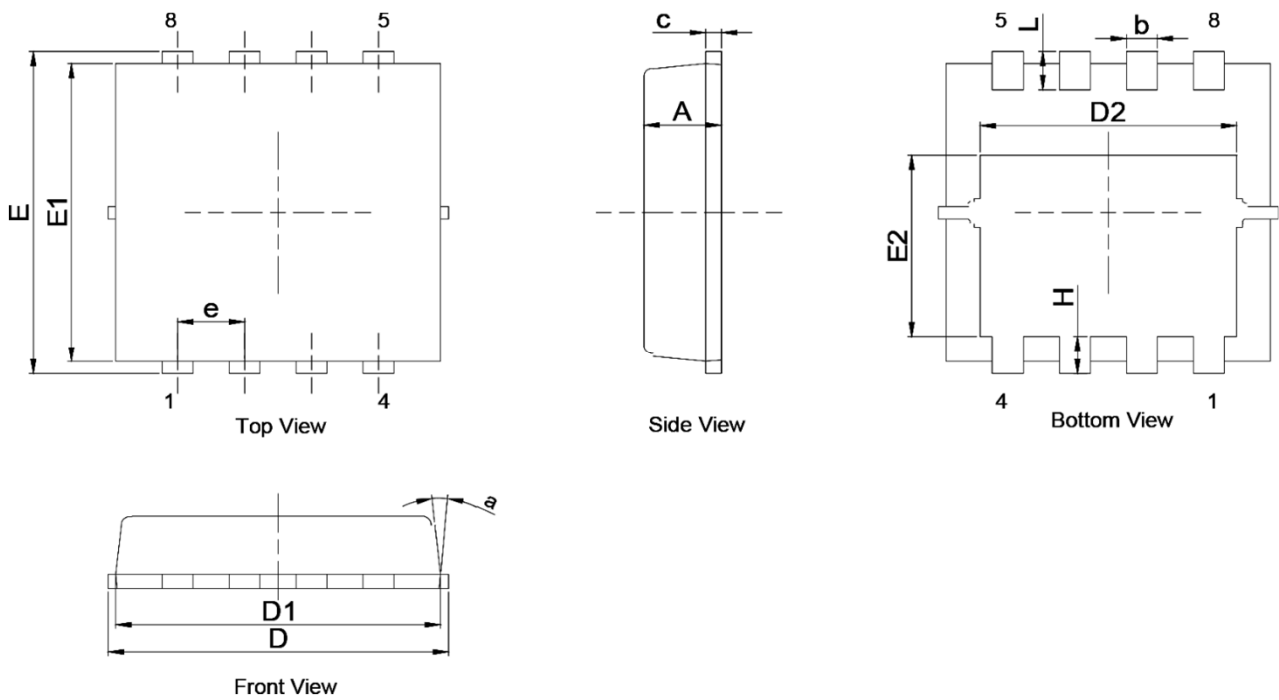
Ordering Information

Device	Package	Reel	Shipping
PSM8PN04R5	PDFN3333-8L	13"	5000 / Tape & Reel

Load With Information




## Product Dimension (PDFN3333-8L)



Suggested PCB Layout

Dim	Millimeters		Inches	
	Min	Max	Min	Max
A	0.70	0.90	0.028	0.035
b	0.20	0.40	0.008	0.016
c	0.10	0.20	0.004	0.008
D	3.20	3.40	0.126	0.134
D1	3.05	3.25	0.120	0.128
D2	2.35	2.69	0.093	0.106
E	3.20	3.45	0.126	0.136
E1	2.85	3.15	0.112	0.124
E2	1.65	1.90	0.065	0.075
e	0.65 BSC.		0.026 BSC.	
H	0.25	0.60	0.010	0.024
L	0.25	0.50	0.010	0.020
a	-	15°	-	15°


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