

60V N-Channel Enhancement Mode MOSFET

Description

The PECN6009 uses advanced trench technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Q_g . This device is ideal for high-frequency switching and synchronous rectification.

General Features

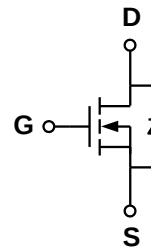
- ◆ $V_{DS} = 60V$ $I_D = 13A$
 $R_{DS(ON)}(Typ.) = 9m\Omega$ @ $V_{GS} = 10V$
 $R_{DS(ON)}(Typ.) = 11m\Omega$ @ $V_{GS} = 4.5V$
- ◆ Excellent gate charge x $R_{DS(on)}$ product(FOM)
- ◆ Very low on-resistance $R_{DS(on)}$
- ◆ 150 °C operating temperature
- ◆ 100% UIS tested

Application

100% UIS TESTED!
100% ΔV_{ds} TESTED!

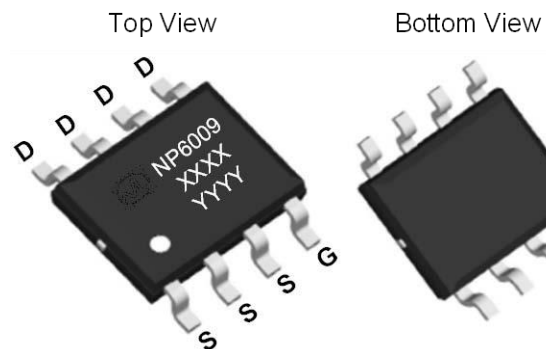
- ◆ Synchronous Rectification in DC/DC and AC/DC Converters
- ◆ Industrial and Motor Drive applications

Schematic diagram



Marking and pin assignment

SOP-8



XXXX—Date Code
 YYYY—Quality Code



Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
PECN6009SR-G	-55°C to +150°C	SOP-8	4000

Absolute Maximum Ratings (TA=25°C unless otherwise noted)

parameter		symbol	limit	unit
Drain-source voltage		V_{DS}	60	V
Gate-source voltage		V_{GS}	±20	V
Continuous Drain Current	TC=25°C	I_D	13	A
	TC=70°C		10	
Pulsed Drain Current		I_{DP}	52	A
Avalanche energy($T_j=25^\circ C$, $V_{DD}=30V$, $V_G=10V$, $L=0.3mH$, $R_g=25\Omega$)		E_{AS}	45	mJ
Power Dissipation	TC=25°C	P_D	3	W
	TC=70°C		2.1	
Operating junction Temperature range		T_j	-55—150	°C

Electrical Characteristics (TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	60	-	-	V
Zero gate voltage drain current	I _{DSS}	V _{DS} =60V, V _{GS} =0V	-	-	1	μA
		T _J =85°C	-	-	5	
Gate Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V	-	-	±100	nA
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.0	1.7	2.5	V
Drain-source on-state resistance	R _{DS(ON)}	V _{GS} =10V, I _D =13A	-	8.5	11	mΩ
		V _{GS} =4.5V, I _D =10A		10.5	13	
Forward Transconductance	g _{FS}	V _{DS} =10V,I _D =13A	-	45	-	S
Diode Characteristics						
Diode Forward Voltage	V _{SD}	I _{SD} =1A,V _{GS} =0V	-	0.72	1.2	V
Diode Continuous Forward Current	I _S		-	-	13	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F = I _S di/dt = 100A/μs	-	19	-	ns
Reverse Recovery Charge	Q _{rr}		-	60	-	nC
Dynamic Characteristics						
Gate Resistance	R _G	V _{GS} =0V, V _{DS} =0V,f=1MHz	-	1.2	1.8	Ω
Input capacitance	C _{ISS}	V _{GS} =0V ,V _{DS} =30V f=1.0MHz	-	1100	-	pF
Output capacitance	C _{OSS}		-	310	-	
Reverse transfer capacitance	C _{RSS}		-	25	-	
Turn-on delay time	t _{D(ON)}	V _{GS} =10V, V _{DS} =30V, R _L =4.7Ω, R _G =3Ω	-	6.6	-	ns
Turn-on Rise time	tr		-	3.4	-	
Turn-off delay time	t _{D(OFF)}		-	24	-	
Turn-off Fall time	t _f		-	3	-	
Total gate charge	Q _g	V _{GS} =10V, V _{DS} =30V, I _D =13A	-	15	-	nC
Gate-source charge	Q _{gs}		-	2.6	-	
Gate-drain charge	Q _{gd}		3	3.6	-	

Thermal Characteristics

Parameter	Symbol	Typ	Max	Unit
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	33	40	$^\circ C/W$
Maximum Junction-to-Ambient ^A		59	75	
Maximum Junction-to-Lead ^B	$R_{\theta JC}$	16	24	

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ C$. The value in any given application depends on the user's specific board design. The current rating is based on the $t \leq 10s$ thermal resistance rating.

B: The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.

Typical Performance Characteristics

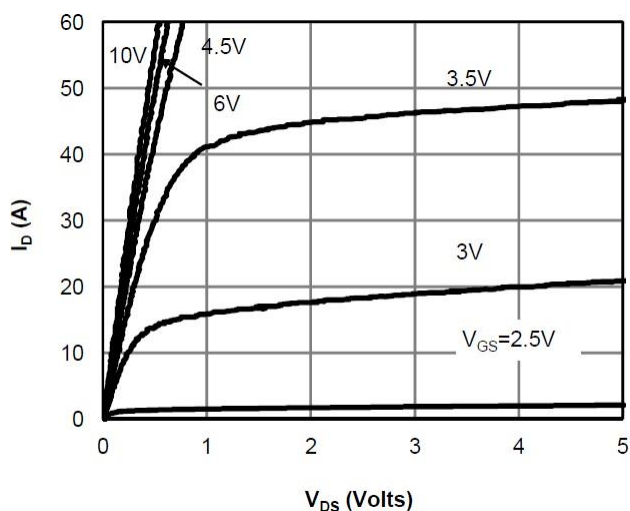


Figure 1: On-Region Characteristics

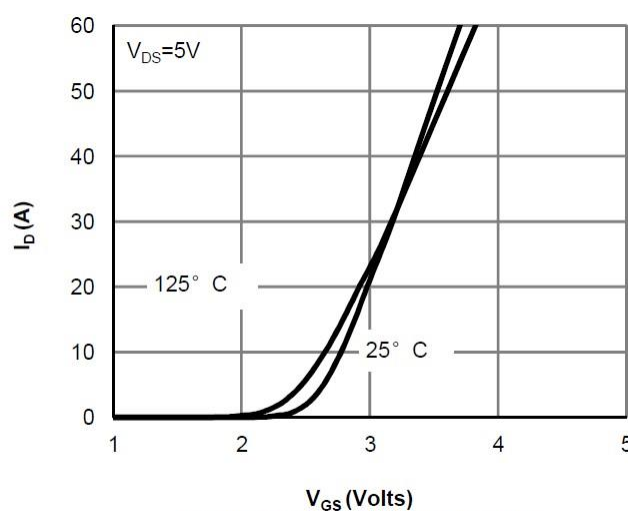


Figure 2: Transfer Characteristics

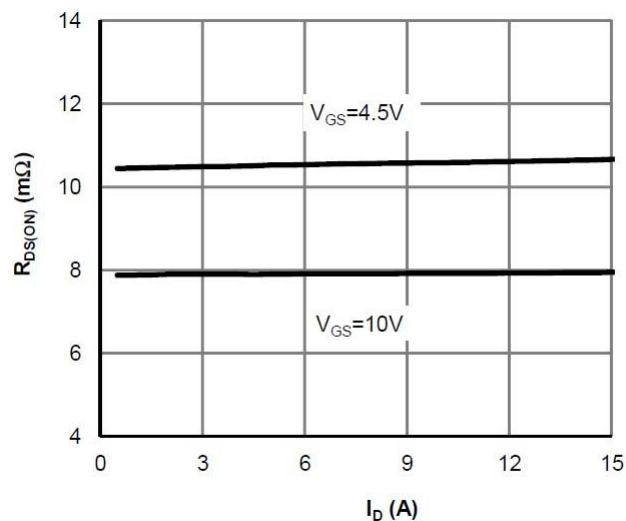


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

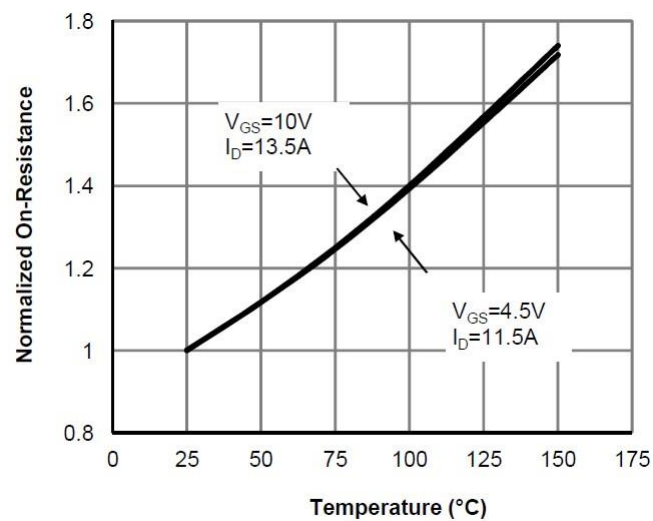


Figure 4: On-Resistance vs. Junction Temperature

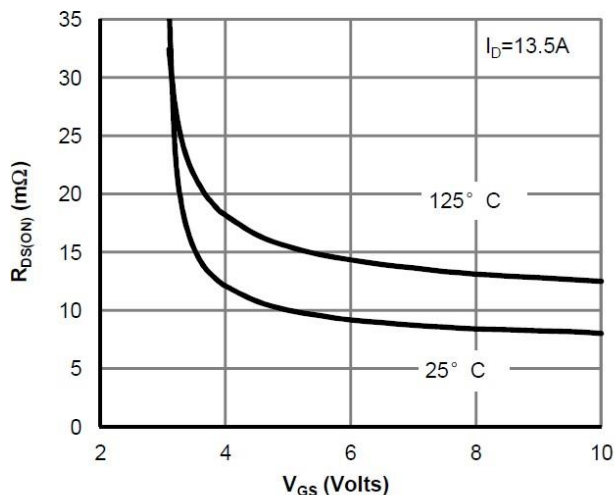


Figure 5: On-Resistance vs. Gate-Source Voltage

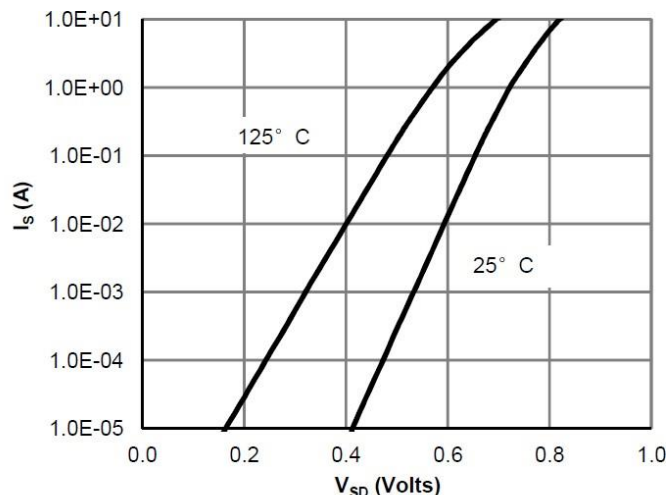


Figure 6: Body-Diode Characteristics

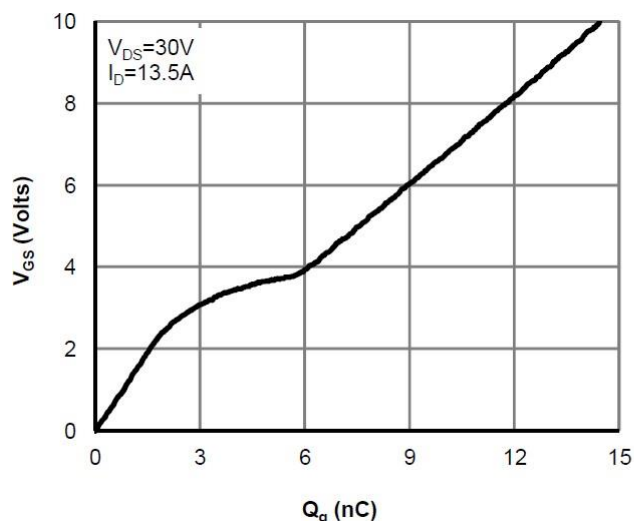


Figure 7: Gate-Charge Characteristics

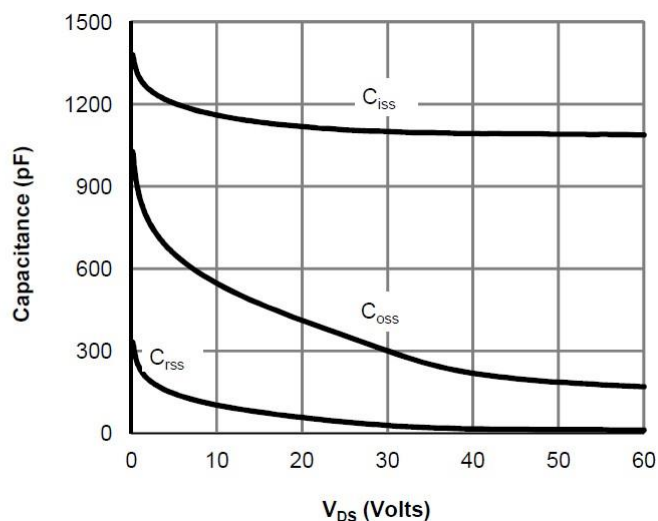


Figure 8: Capacitance Characteristics

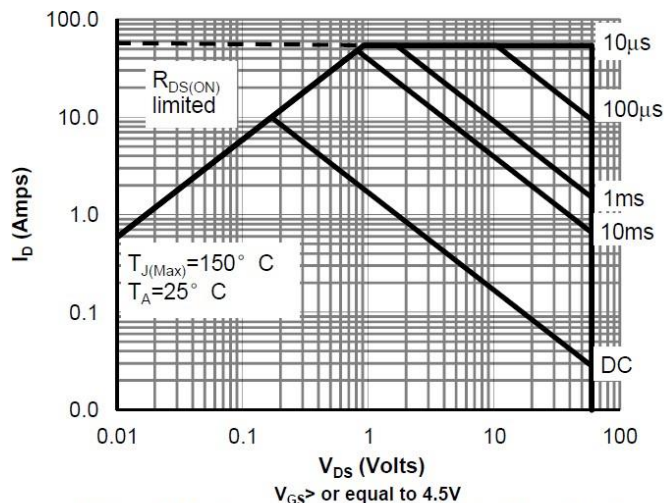


Figure 9: Maximum Forward Biased Safe Operating Area

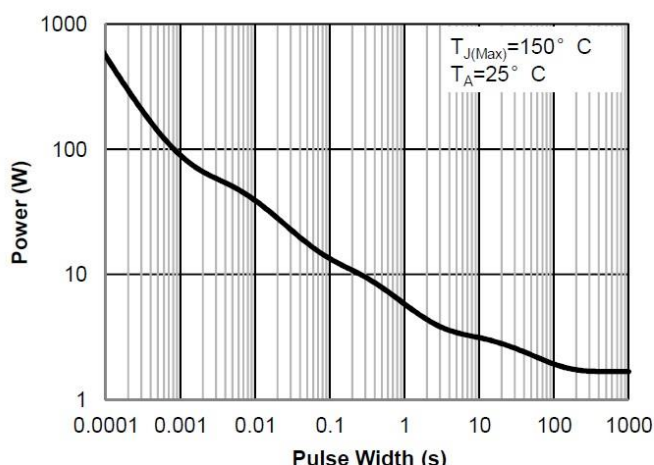


Figure 10: Single Pulse Power Rating Junction-to-Ambient

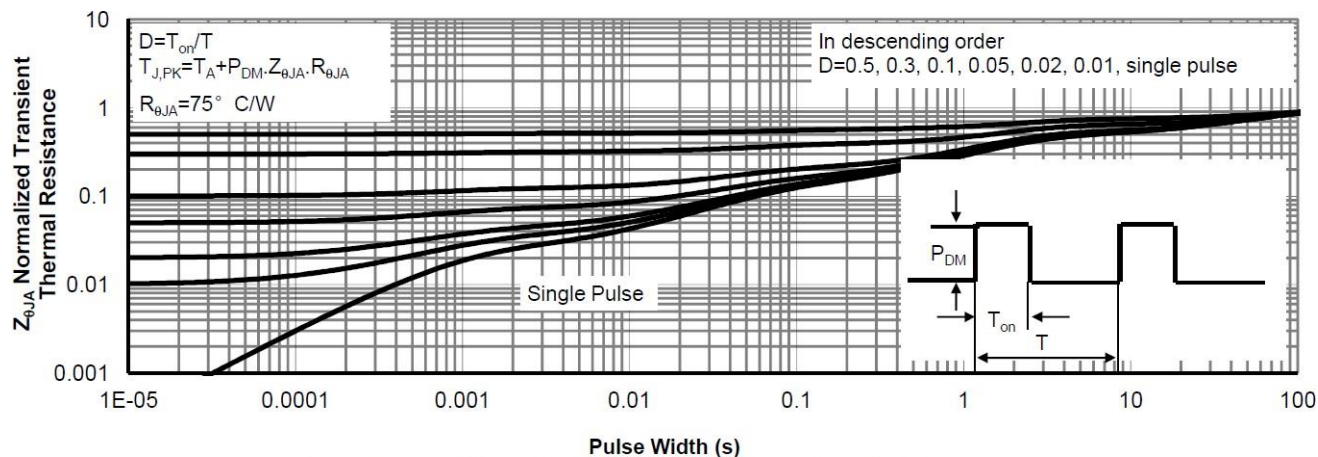
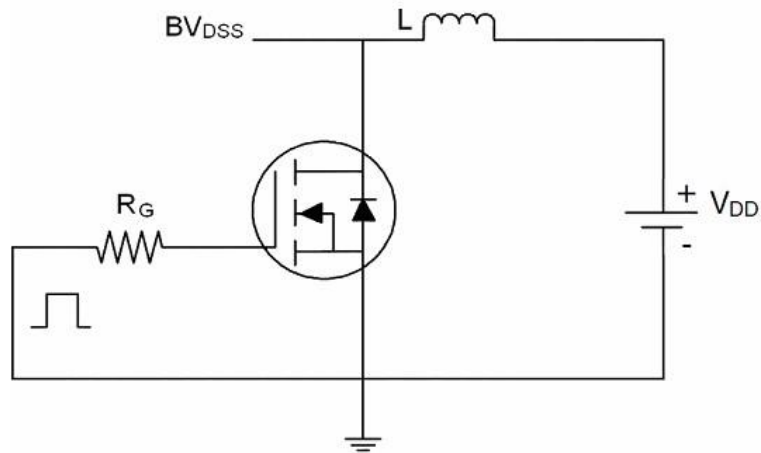


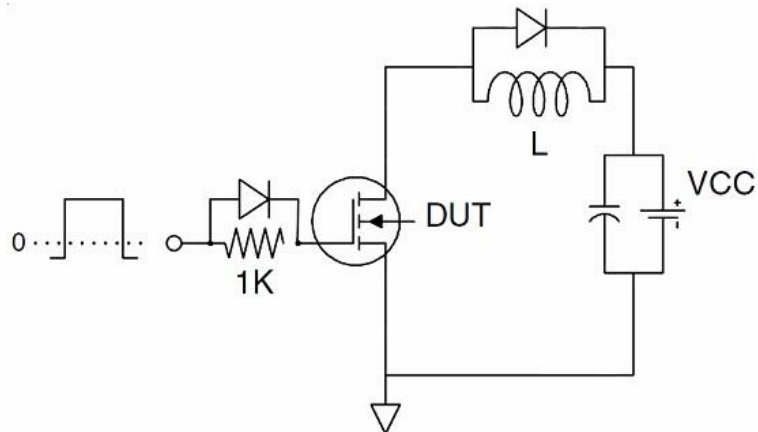
Figure 11: Normalized Maximum Transient Thermal Impedance

Test Circuit:

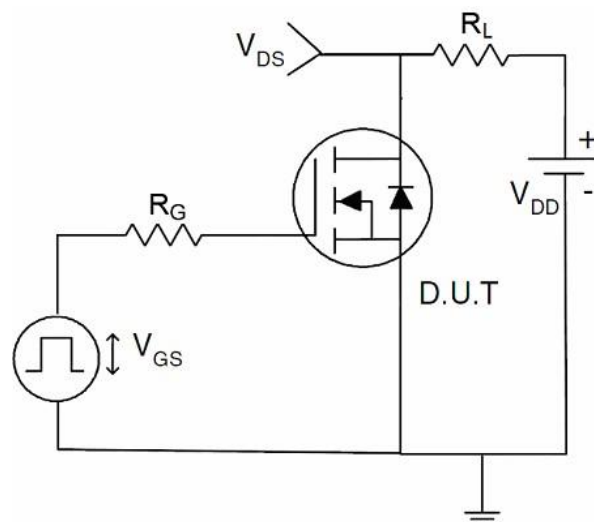
1 、EAS Test Circuit



2 、Gate Charge Test Circuit

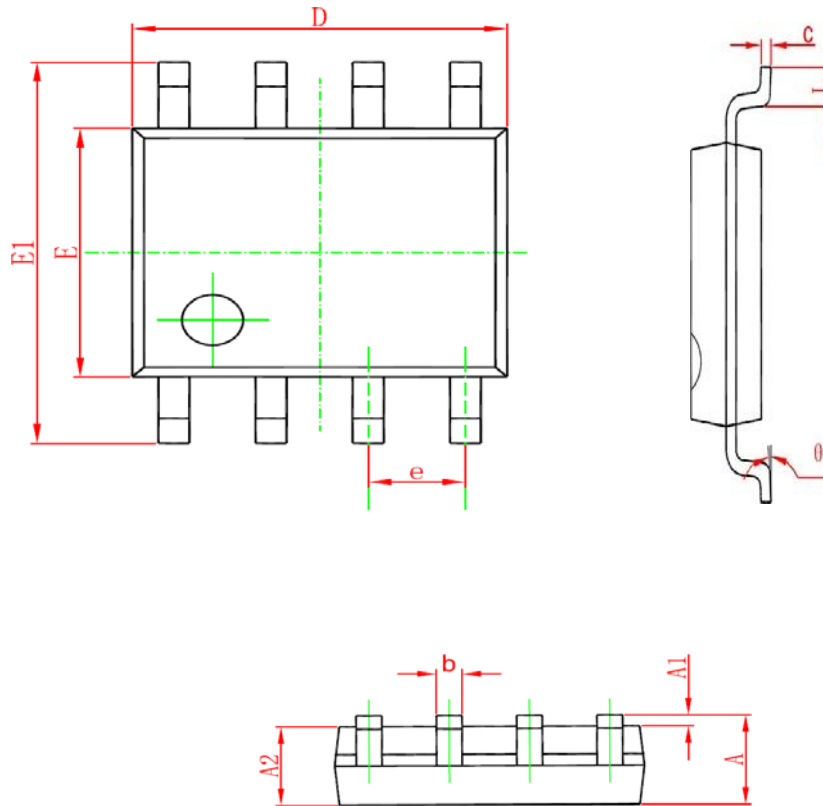


3 、Switch Time Test Circuit



Package Information

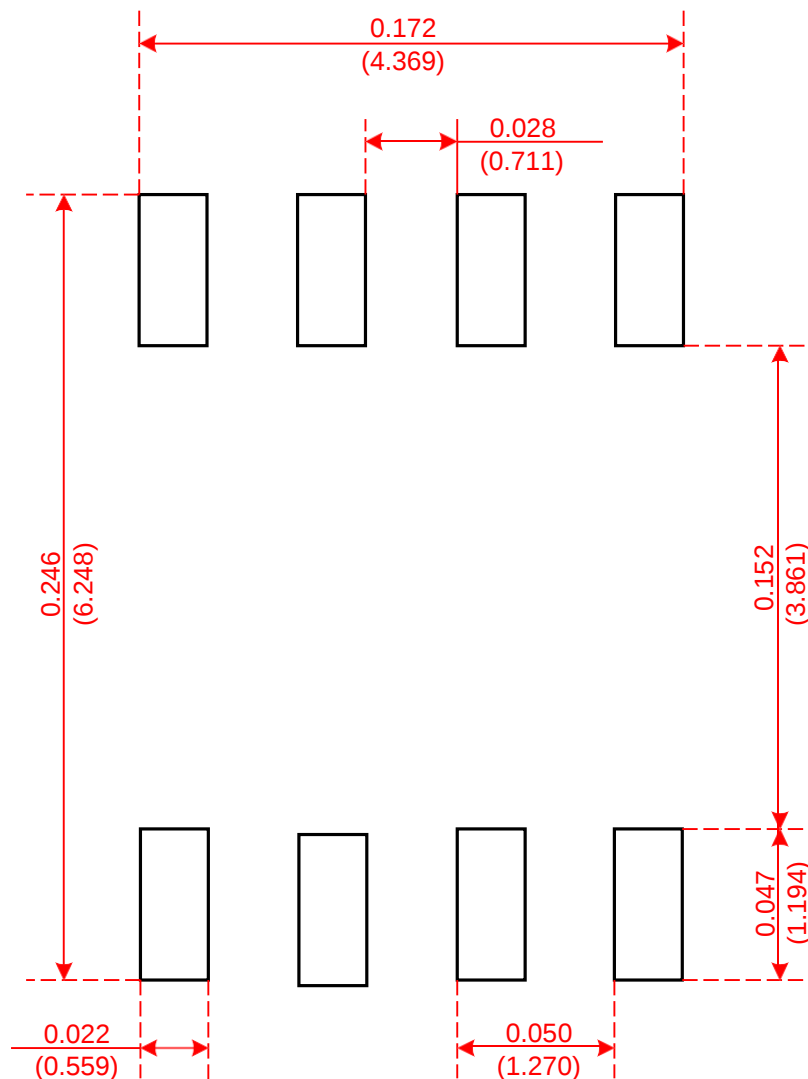
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Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

Recommended Minimum Pads

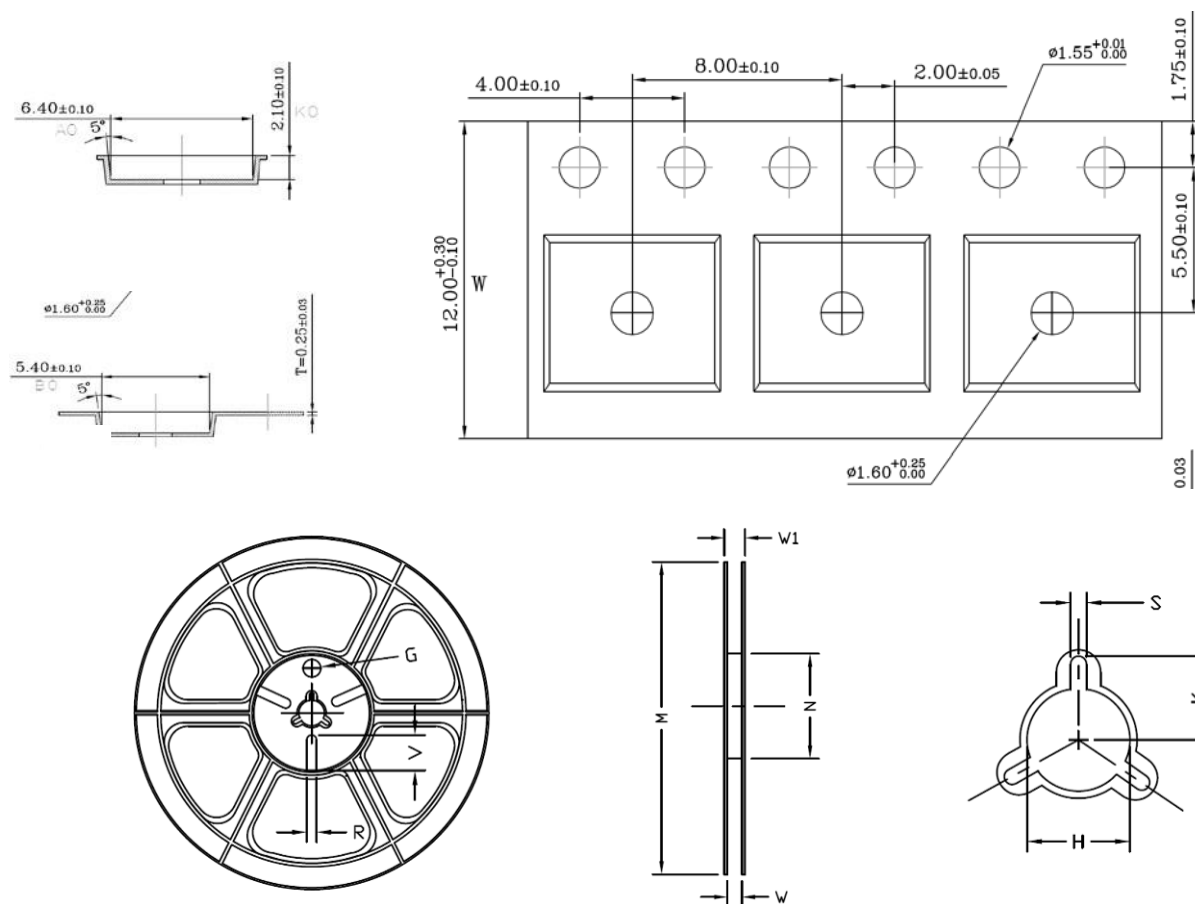
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Recommended Minimum Pads
Dimensions in Inches/(mm)

Tape and Reel

- SOP-8



Tape Size	Reel Size	M	N	W	W1	H	K	S	G	R	V
12mm	Φ330	Φ330.00 ±0.50	Φ97.00 ±0.30	13.00 ±0.30	17.40 ±1.00	Φ13.00 ±0.5	10.6	2.00 ±0.50	—	—	—

Unit Per Reel:
4000pcs

