

Features

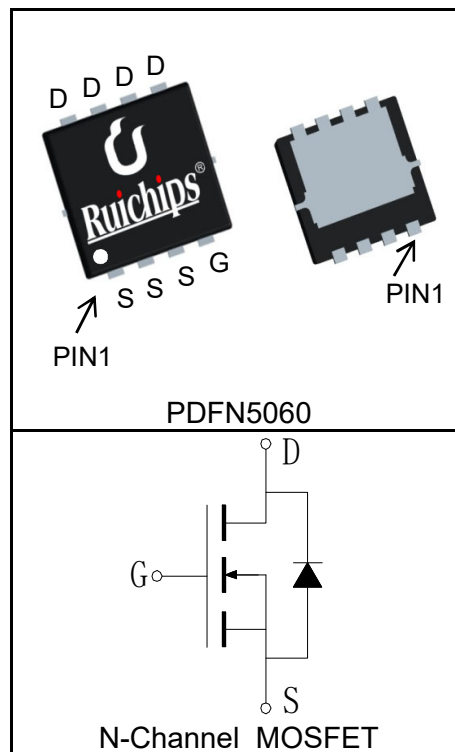
- 120V/90A,
- $R_{DS(ON)} = 6.2m\Omega(Typ.)@V_{GS}=10V$
- $R_{DS(ON)} = 7m\Omega(Typ.)@V_{GS}=4.5V$
- Ultra Low On-Resistance
- Fast Switching Speed
- 100% avalanche tested
- Uses Ruichips advanced RUISGT™ technology
- Lead Free and Green Devices Available (RoHS Compliant)



Applications

- Synchronous Rectification for Flyback Converters
- PD Adaptors
- Charger for Mobile

Pin Description



Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit	
Common Ratings ($T_C=25^\circ C$ Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage	120	V	
V_{GSS}	Gate-Source Voltage	± 20		
T_J	Maximum Junction Temperature	150	$^\circ C$	
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$	
I_S	Diode Continuous Forward Current	$T_C=25^\circ C$	50	A
Mounted on Large Heat Sink				
$I_{DP}^{①}$	300 μs Pulse Drain Current Tested	$T_C=25^\circ C$	360	A
$I_D^{②}$	Continuous Drain Current@ $T_C(V_{GS}=10V)$	$T_C=25^\circ C$	90	A
		$T_C=100^\circ C$	57	
	Continuous Drain Current@ $T_A(V_{GS}=10V)^{③}$	$T_A=25^\circ C$	14	
		$T_A=70^\circ C$	11	
P_D	Maximum Power Dissipation@ T_C	$T_C=25^\circ C$	74	W
		$T_C=100^\circ C$	30	
	Maximum Power Dissipation@ $T_A^{③}$	$T_A=25^\circ C$	2.2	
		$T_A=70^\circ C$	1.4	

Symbol	Parameter	Rating	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	1.67	°C/W
$R_{\theta JA}^{(3)}$	Thermal Resistance-Junction to Ambient	56	°C/W
Drain-Source Avalanche Ratings			
$E_{AS}^{(4)}$	Avalanche Energy, Single Pulsed	484	mJ

Electrical Characteristics ($T_C=25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Condition	RUH120N90M			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	120			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=120V, V_{GS}=0V$			1	μA
		$T_J=125^\circ C$			30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	1.2	1.8	2.5	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 25V, V_{DS}=0V$			± 100	nA
$R_{DS(ON)}^{(5)}$	Drain-Source On-state Resistance	$V_{GS}=4.5V, I_{DS}=28A$		7	8.5	$m\Omega$
		$V_{GS}=10V, I_{DS}=28A$		6.2	7	$m\Omega$
		$T_J=125^\circ C$		10.7	12.8	$m\Omega$
Diode Characteristics						
$V_{SD}^{(5)}$	Diode Forward Voltage	$I_{SD}=28A, V_{GS}=0V$		0.9	1.2	V
g_{FS}	Forward Transconductance	$V_{DS}=5V, I_D=28A$		128		S
t_{rr}	Reverse Recovery Time	$I_{SD}=28A, dI_{SD}/dt=100A/\mu s$		60		ns
Q_{rr}	Reverse Recovery Charge			156		nC
Dynamic Characteristics ⁽⁶⁾						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1MHz$		0.8		Ω
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=60V,$ Frequency=1.0MHz		4250		pF
C_{oss}	Output Capacitance			265		
C_{rss}	Reverse Transfer Capacitance			16		
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=60V, I_{DS}=28A,$ $V_{GEN}=10V, R_G=1.2\Omega$		17		ns
t_r	Turn-on Rise Time			47		
$t_{d(OFF)}$	Turn-off Delay Time			51		
t_f	Turn-off Fall Time			28		
Gate Charge Characteristics ⁽⁶⁾						
Q_g	Total Gate Charge	$V_{DS}=60V, V_{GS}=10V,$ $I_{DS}=28A$		80		nC
Q_{gs}	Gate-Source Charge			20		
Q_{gd}	Gate-Drain Charge			5.5		

Notes:

- ①Pulse width limited by safe operating area.
- ②Calculated continuous current based on maximum allowable junction temperature. The package limitation current is 50A.
- ③When mounted on 1 inch square copper board, $t \leq 10\text{sec}$.
- ④Limited by T_{Jmax} , $I_{AS} = 44\text{A}$, $V_{DD} = 60\text{V}$, $R_G = 50\Omega$, Starting $T_J = 25^\circ\text{C}$.
- ⑤Pulse test; Pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
- ⑥Guaranteed by design, not subject to production testing.

Ordering and Marking Information

Device	Marking	Package	Packaging	Quantity	Reel Size	Tape width
RUH120N90M	RUH120N90M	PDFN5060	Tape&Reel	5000	13"	12mm

① The following characters could be different and means:



1st line: Part Number (RUH120N90M)

2nd line: Ruichips Company Logo

3rd line: Date code (XXYWWLLL)

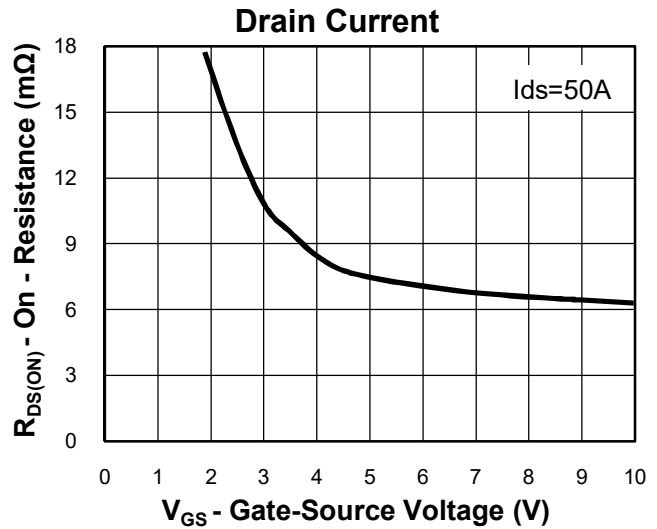
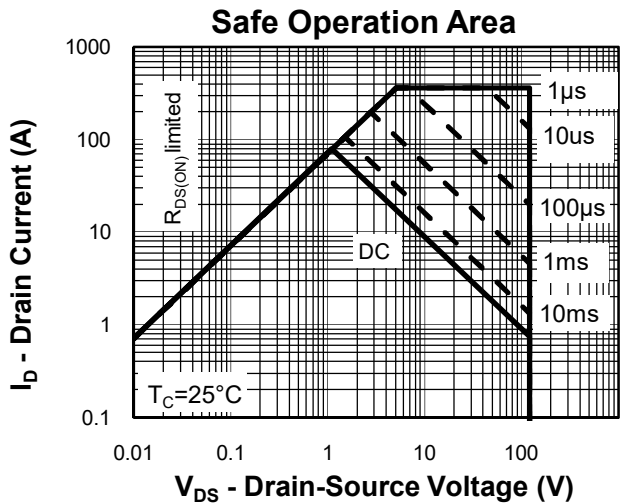
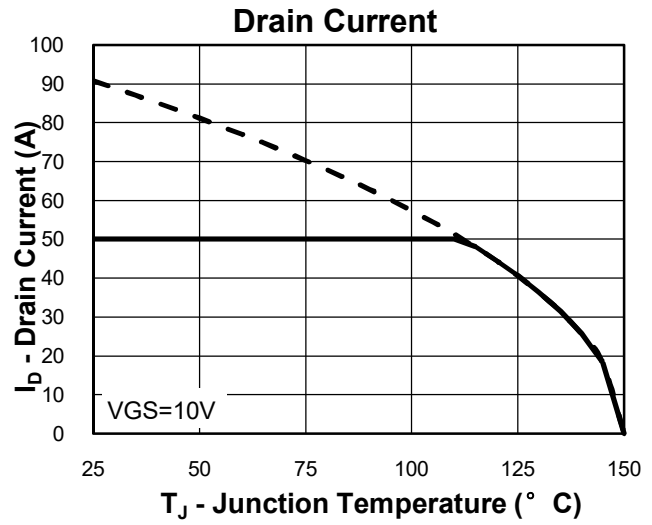
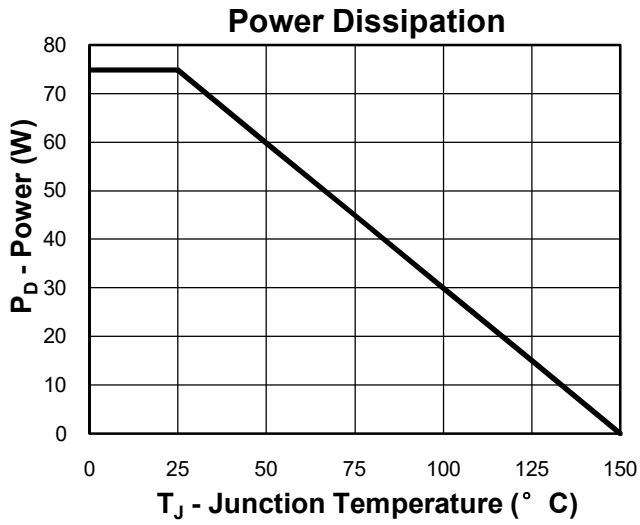
XX =Assembly site code

Y =Year

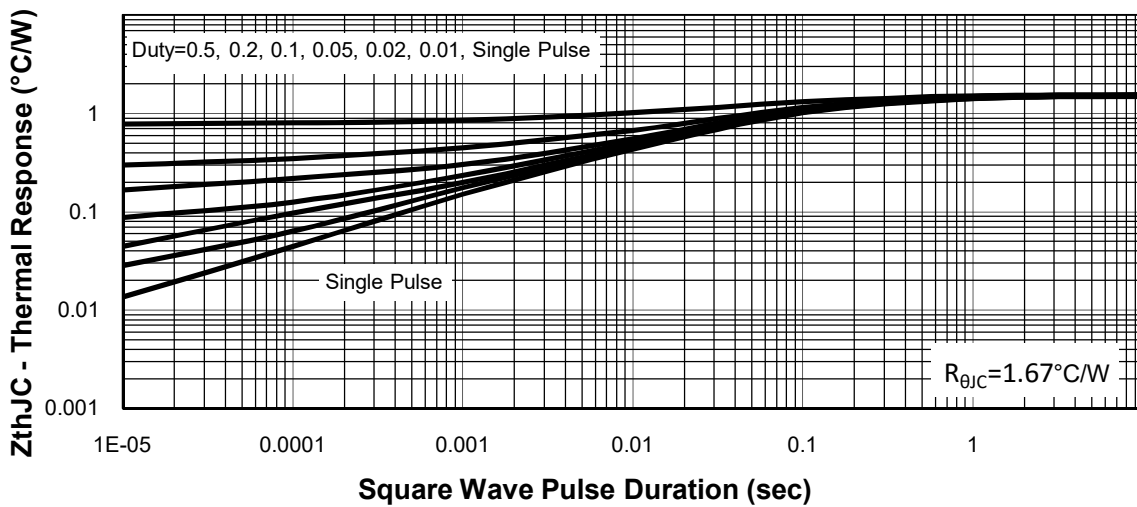
WW =Work Week

LLL =Wafer Lot Number

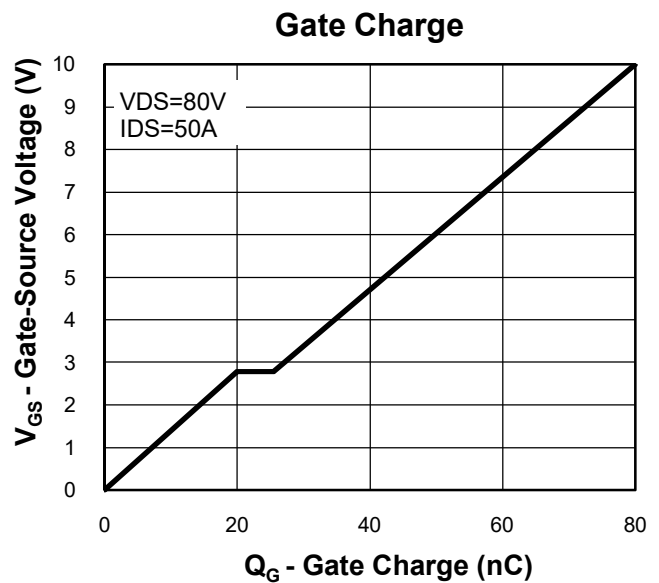
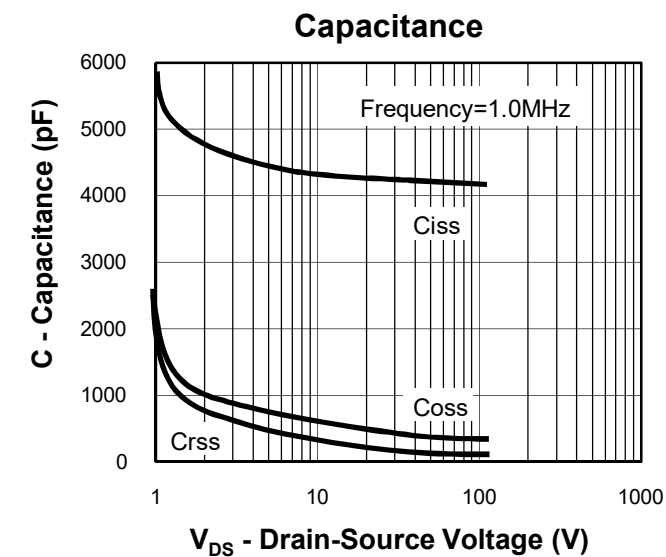
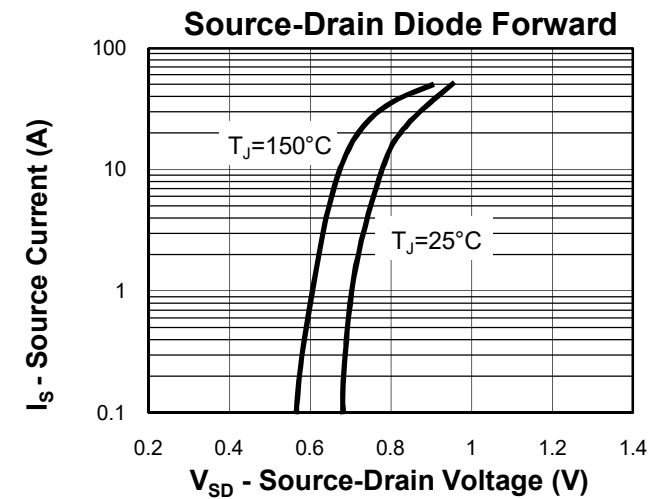
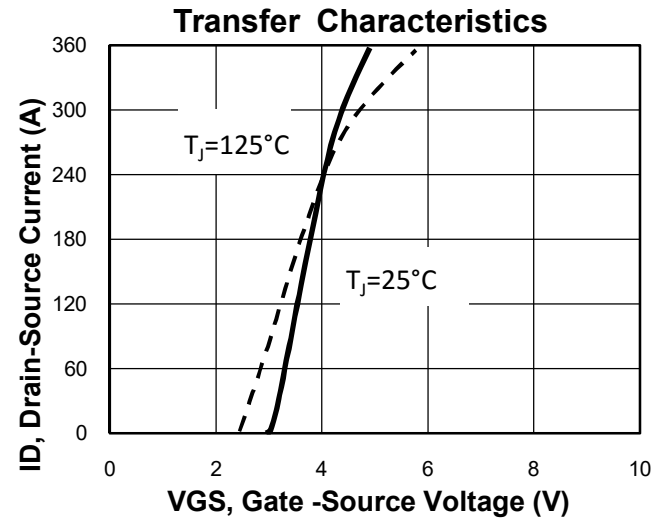
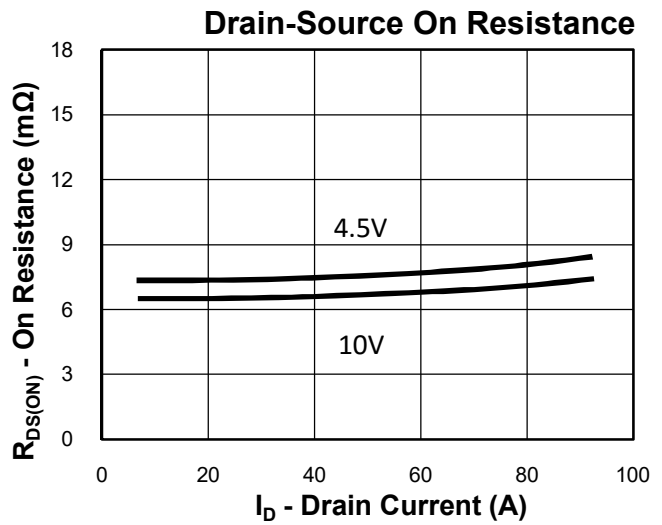
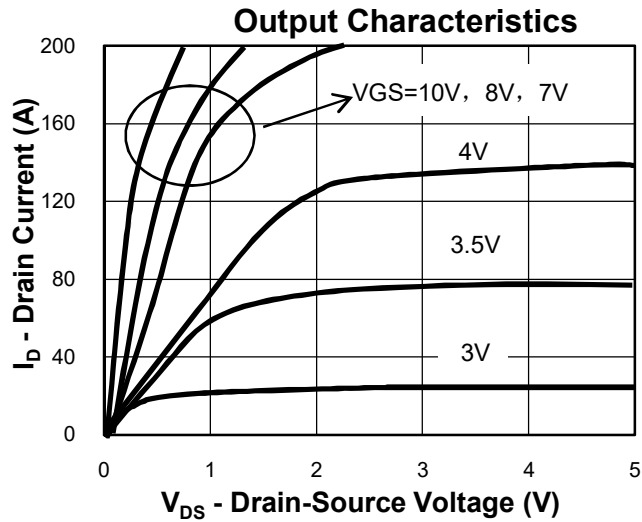
Typical Characteristics



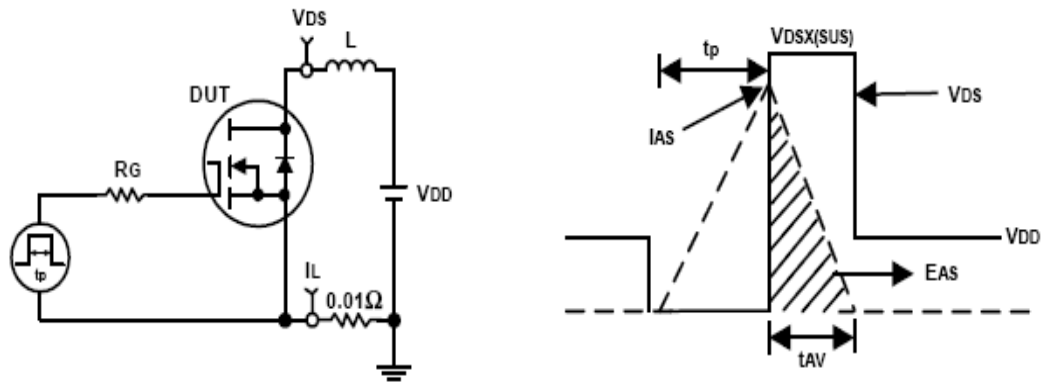
Thermal Transient Impedance



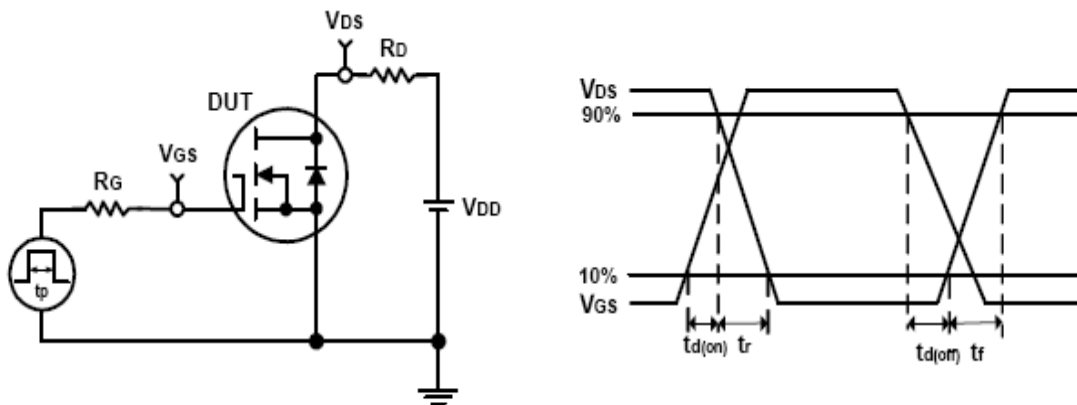
Typical Characteristics



Avalanche Test Circuit and Waveforms

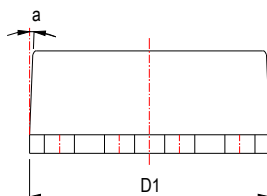
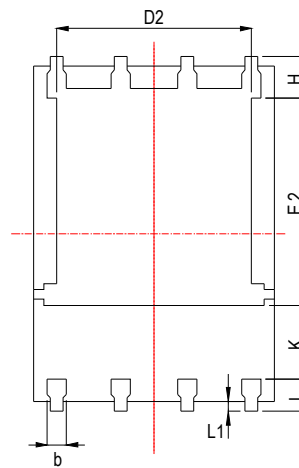
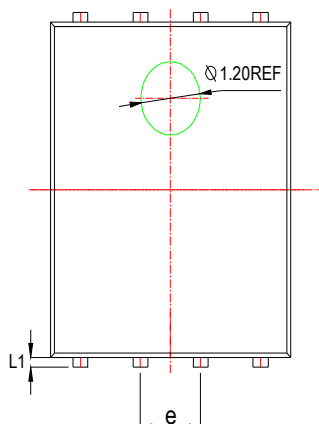
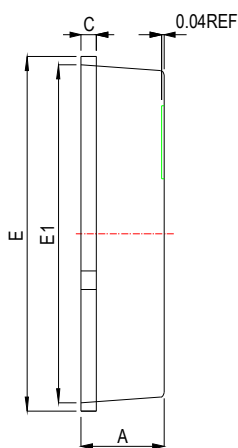


Switching Time Test Circuit and Waveforms

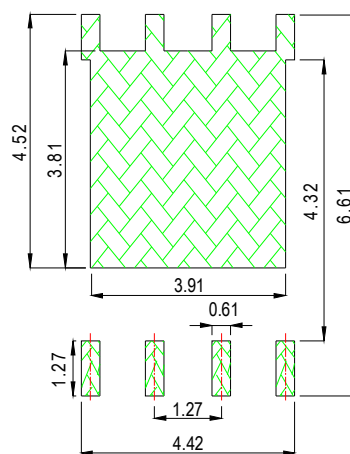


Package Information

PDFN5060



Land Pattern
(Only for Reference)



SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.90	1.00	1.10	0.035	0.039	0.043
b	0.33	0.42	0.51	0.013	0.017	0.020
c	0.20	0.25	0.30	0.008	0.010	0.012
D1	4.80	4.90	5.00	0.189	0.193	0.197
D2	3.61	3.79	3.96	0.142	0.149	0.156
E	5.90	6.00	6.10	0.232	0.236	0.240
E1	5.65	5.75	5.85	0.222	0.226	0.230
E2	3.38	3.58	3.78	0.133	0.141	0.149
e	1.27 BSC			0.005 BSC		
H	0.41	0.51	0.61	0.016	0.020	0.024
k	1.10			0.043		
L	0.51	0.61	0.71	0.020	0.024	0.028
L1	0.06	0.13	0.20	0.002	0.005	0.008
a	0°		12°	0°		12°

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