

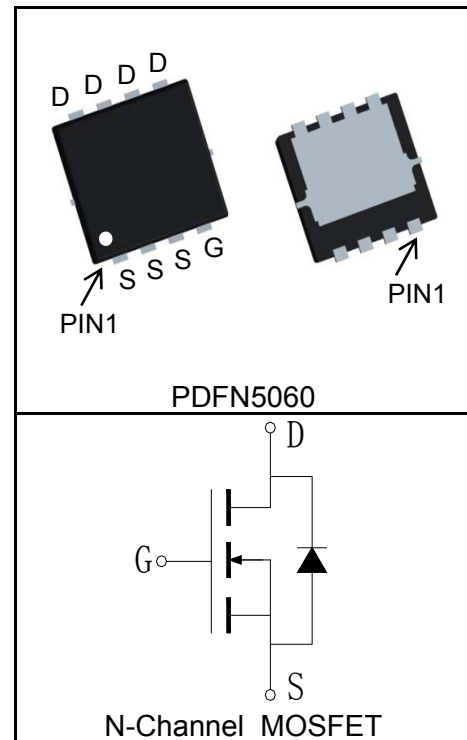
### Features

- 30V/90A,
- $R_{DS(ON)} = 2.8m\Omega(Typ.)@V_{GS}=10V$
- $R_{DS(ON)} = 3.4m\Omega(Typ.)@V_{GS}=4.5V$
- Super High Dense Cell Design
- Ultra Low On-Resistance
- Fast Switching Speed
- 100% avalanche tested
- Lead Free and Green Devices Available (RoHS Compliant)

### Applications

- DC/DC Converters
- Load switch
- Synchronous rectification

### Pin Description



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit	
<b>Common Ratings</b> ( $T_C=25^\circ C$ Unless Otherwise Noted)				
$V_{DSS}$	Drain-Source Voltage	30	V	
$V_{GSS}$	Gate-Source Voltage	$\pm 20$		
$T_J$	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
<b>Mounted on Large Heat Sink</b>				
$I_{DP}^{①}$	300 $\mu s$ 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@ $T_A(V_{GS}=10V)^{③}$	$T_A=25^\circ C$	28	
		$T_A=70^\circ C$	21	
$P_D$	Maximum Power Dissipation@ $T_C$	$T_C=25^\circ C$	54	W
		$T_C=100^\circ C$	22	
	Maximum Power Dissipation@ $T_A^{③}$	$T_A=25^\circ C$	4.2	
		$T_A=70^\circ C$	2.7	

Symbol	Parameter	Rating	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	2.3	°C/W
$R_{\theta JA}^{(3)}$	Thermal Resistance-Junction to Ambient	30	°C/W
<b>Drain-Source Avalanche Ratings</b>			
$E_{AS}^{(4)}$	Avalanche Energy, Single Pulsed	156	mJ

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

Symbol	Parameter	Test Condition	RU3091M			Unit
			Min.	Typ.	Max.	
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	30			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=30V, V_{GS}=0V$			1	$\mu A$
		$T_J=125^\circ\text{C}$			30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	1		2.5	V
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$			$\pm 100$	nA
$R_{DS(ON)}^{(5)}$	Drain-Source On-state Resistance	$V_{GS}=4.5V, I_{DS}=35A$		3.4	4.5	$m\Omega$
		$V_{GS}=10V, I_{DS}=50A$		2.8	3.5	$m\Omega$
<b>Diode Characteristics</b>						
$V_{SD}^{(5)}$	Diode Forward Voltage	$I_{SD}=50A, V_{GS}=0V$			1.2	V
$t_{rr}$	Reverse Recovery Time	$I_{SD}=50A, dI_{SD}/dt=100A/\mu s$		30		ns
$Q_{rr}$	Reverse Recovery Charge			36		nC
<b>Dynamic Characteristics<sup>(6)</sup></b>						
$R_G$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$		1.3		$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=15V,$ Frequency=1.0MHz		3280		pF
$C_{oss}$	Output Capacitance			580		
$C_{rss}$	Reverse Transfer Capacitance			290		
$t_{d(ON)}$	Turn-on Delay Time		$V_{DD}=15V, I_{DS}=20A,$ $V_{GEN}=10V, R_G=4.7\Omega$		8	
$t_r$	Turn-on Rise Time			12		
$t_{d(OFF)}$	Turn-off Delay Time			35		
$t_f$	Turn-off Fall Time			9		
<b>Gate Charge Characteristics<sup>(6)</sup></b>						
$Q_g$	Total Gate Charge	$V_{DS}=24V, V_{GS}=10V,$ $I_{DS}=20A$		60		nC
$Q_{gs}$	Gate-Source Charge			15		
$Q_{gd}$	Gate-Drain Charge			22		

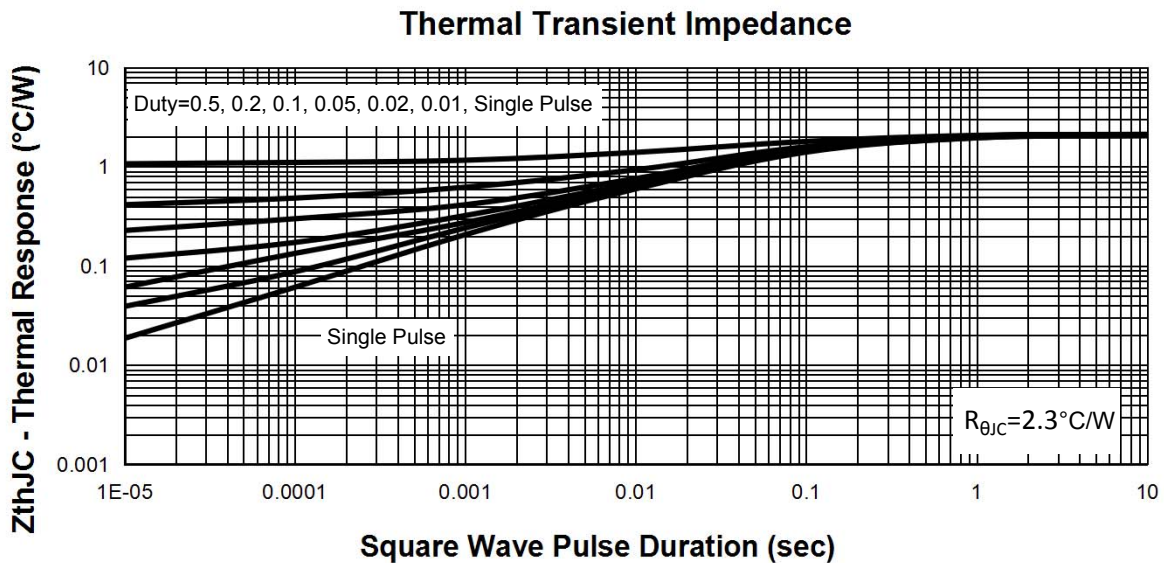
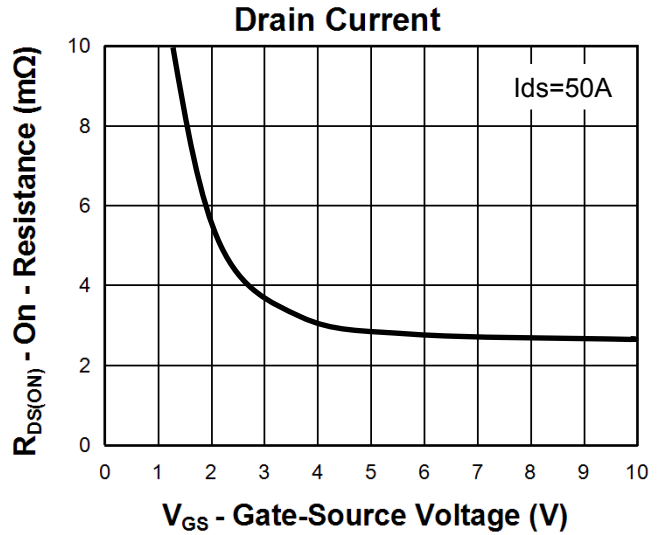
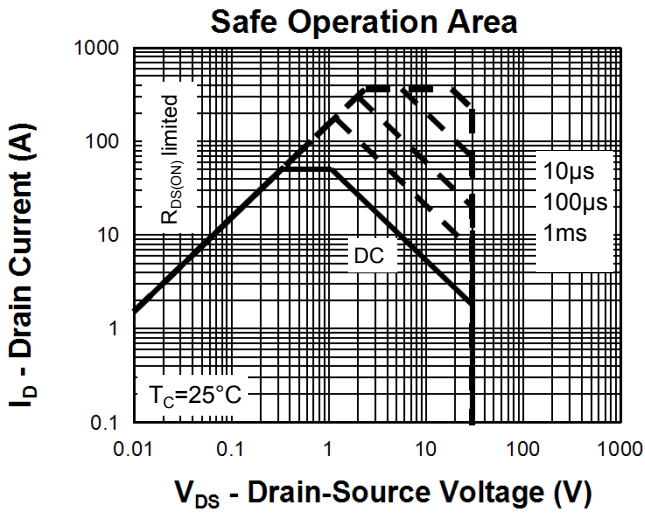
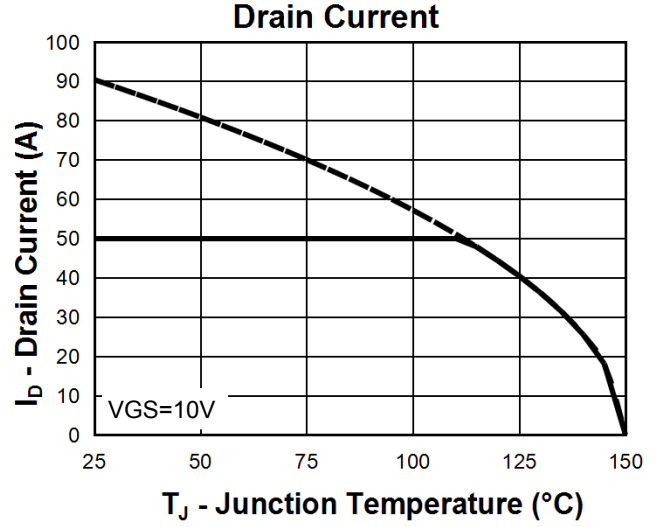
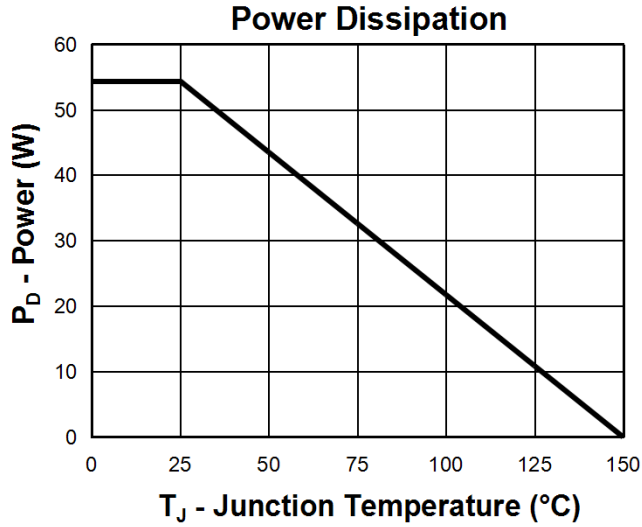
**Notes:**

- ① Max current is limited to 50A by the package.
- ② Pulse width limited by safe operating area.
- ③ When mounted on 1 inch square copper board, t 10sec.
- ④ Limited by TJmax, IAS =25A, VDD =24V, RG = 50Ω , Starting TJ = 25° C.
- ⑤ Pulse test ; Pulse width300s, duty cycle2%.
- ⑥ Guaranteed by design, not subject to production testing.

**Ordering and Marking Information**

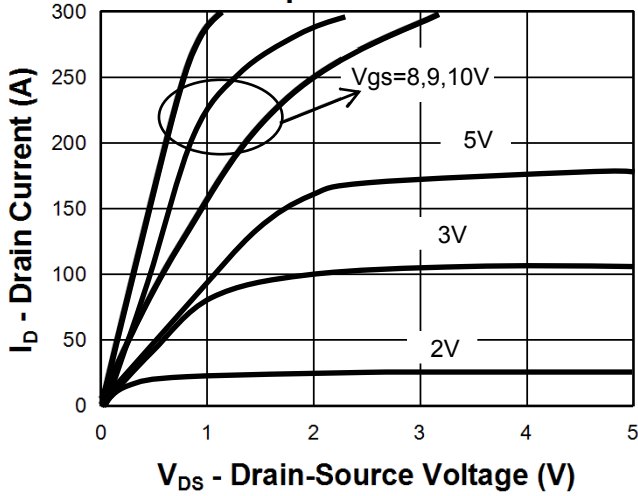
<b>Device</b>	<b>Marking</b>	<b>Package</b>	<b>Packaging</b>	<b>Quantity</b>	<b>Reel Size</b>	<b>Tape width</b>
RU3091M	RU3091M	PDFN5060	Tape&Reel	3000	13"	12mm

**Typical Characteristics**

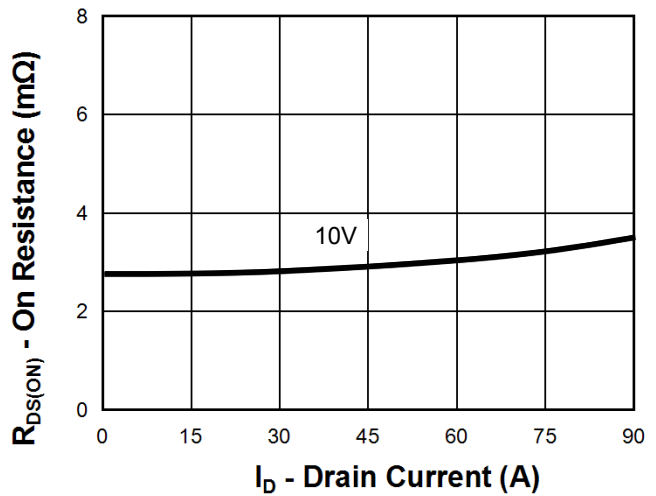


**Typical Characteristics**

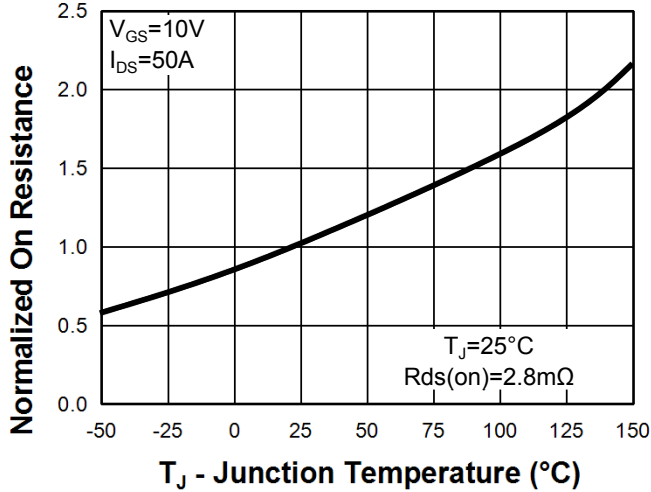
**Output Characteristics**



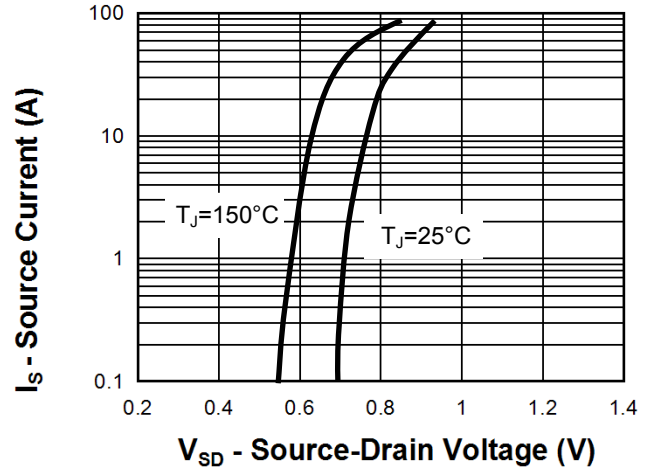
**Drain-Source On Resistance**



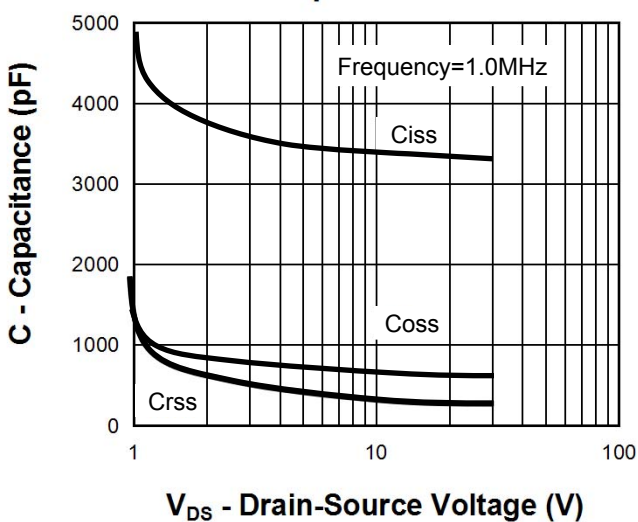
**Drain-Source On Resistance**



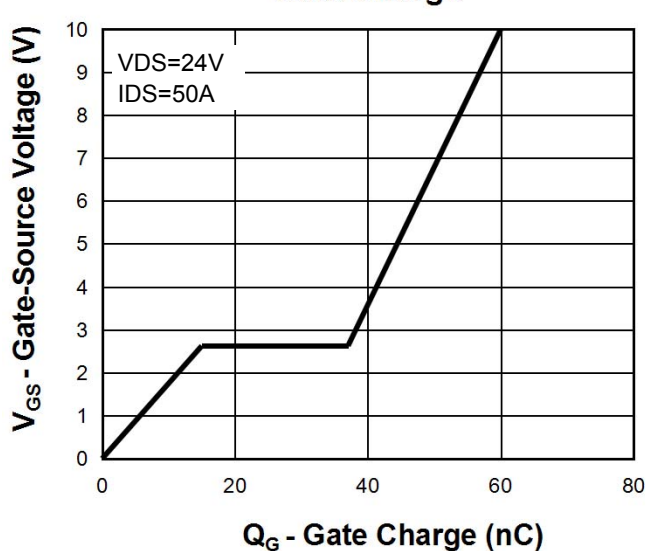
**Source-Drain Diode Forward**



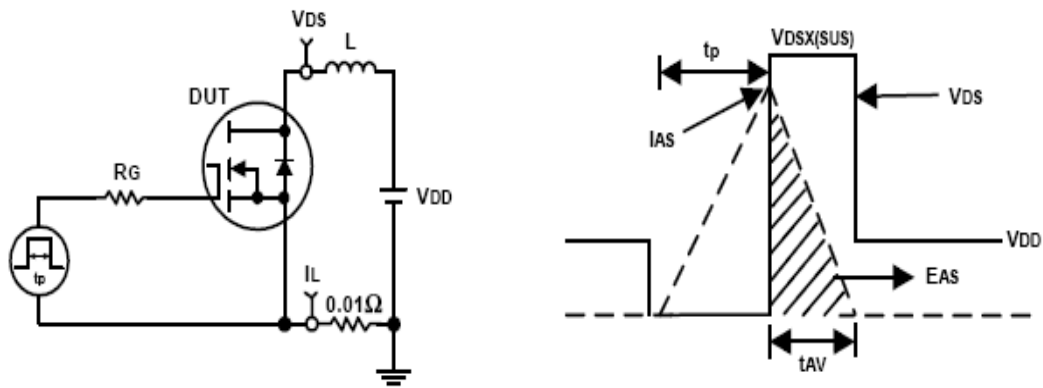
**Capacitance**



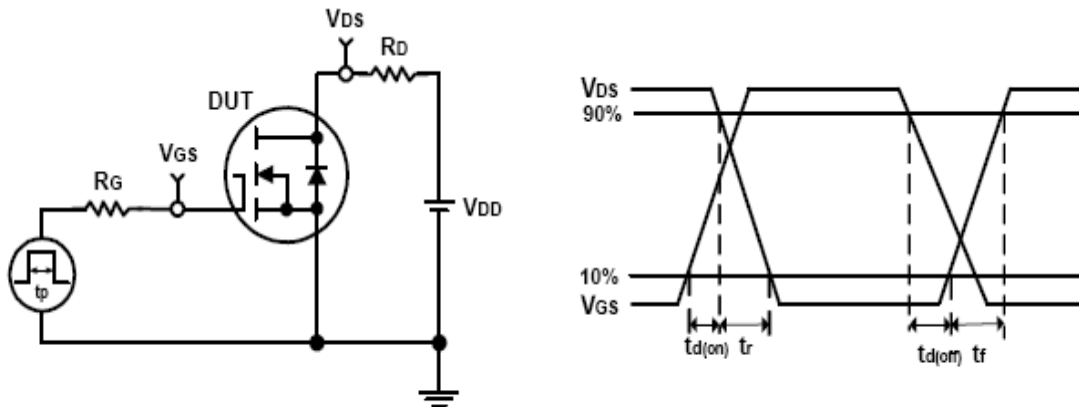
**Gate Charge**



**Avalanche Test Circuit and Waveforms**

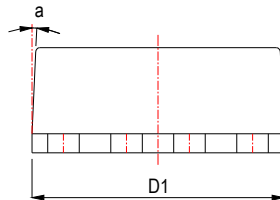
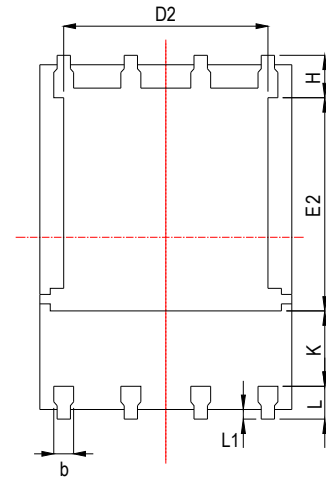
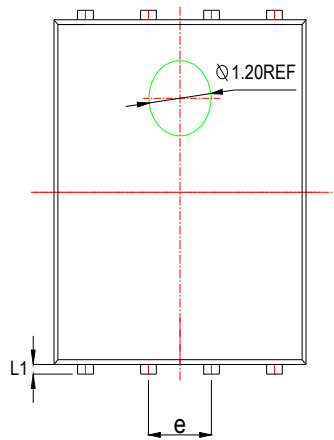
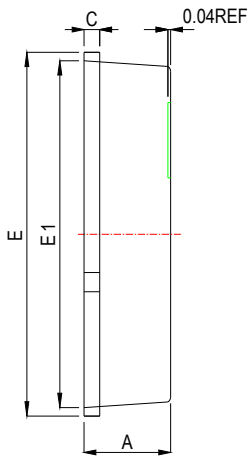


**Switching Time Test Circuit and Waveforms**

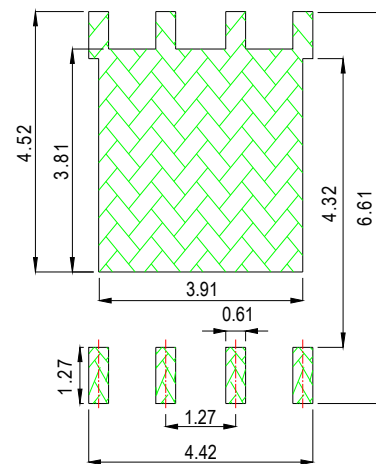


**Package Information**

**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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