

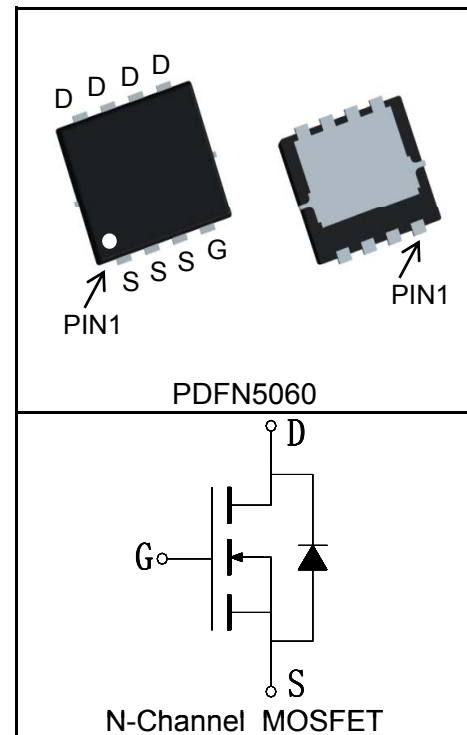
### Features

- 60V/50A,  
 $R_{DS(ON)} = 10\text{m}\Omega(\text{Typ.})@V_{GS}=10\text{V}$   
 $R_{DS(ON)} = 12\text{m}\Omega(\text{Typ.})@V_{GS}=4.5\text{V}$
- Super High Dense Cell Design
- Ultra Low On-Resistance
- 100% avalanche tested
- Lead Free and Green Devices Available (RoHS Compliant)

### Applications

- SMPS and General Purpose Applications
- Uninterruptible Power Supply

### Pin Description



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
<b>Common Ratings</b> ( $T_C=25^\circ\text{C}$ Unless Otherwise Noted)			
$V_{DSS}$	Drain-Source Voltage	60	V
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	
$T_J$	Maximum Junction Temperature	150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$I_S$	Diode Continuous Forward Current	$T_C=25^\circ\text{C}$ 50	A
<b>Mounted on Large Heat Sink</b>			
$I_{DP}^{①}$	300 $\mu\text{s}$ Pulse Drain Current Tested	$T_C=25^\circ\text{C}$ 200	A
$I_D^{②}$	Continuous Drain Current@ $T_C(V_{GS}=10\text{V})$	$T_C=25^\circ\text{C}$ 50	A
		$T_C=100^\circ\text{C}$ 31	
	Continuous Drain Current@ $T_A(V_{GS}=10\text{V})^{③}$	$T_A=25^\circ\text{C}$ 13	
		$T_A=70^\circ\text{C}$ 10	
$P_D$	Maximum Power Dissipation@ $T_C$	$T_C=25^\circ\text{C}$ 43	W
		$T_C=100^\circ\text{C}$ 17	
	Maximum Power Dissipation@ $T_A^{③}$	$T_A=25^\circ\text{C}$ 4.2	
		$T_A=70^\circ\text{C}$ 2.7	

Symbol	Parameter	Rating	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	2.9	°C/W
$R_{\theta JA}$ <sup>③</sup>	Thermal Resistance-Junction to Ambient	30	°C/W
<b>Drain-Source Avalanche Ratings</b>			
$E_{AS}$ <sup>④</sup>	Avalanche Energy, Single Pulsed	64	mJ

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

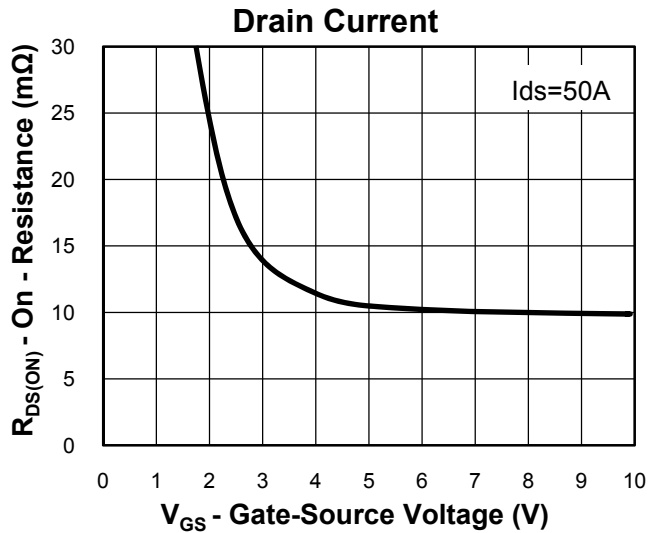
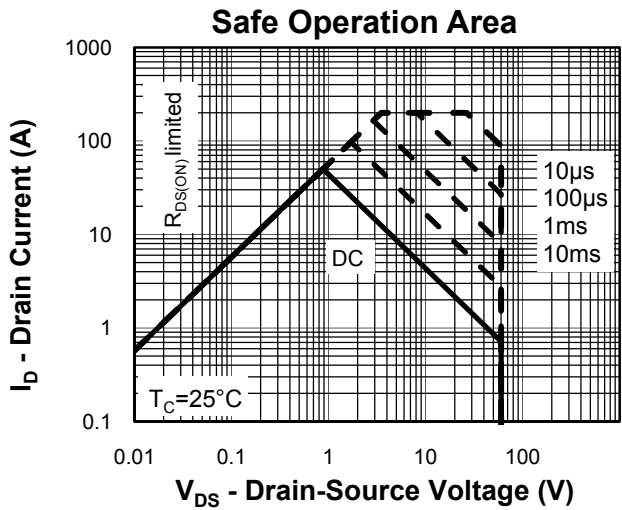
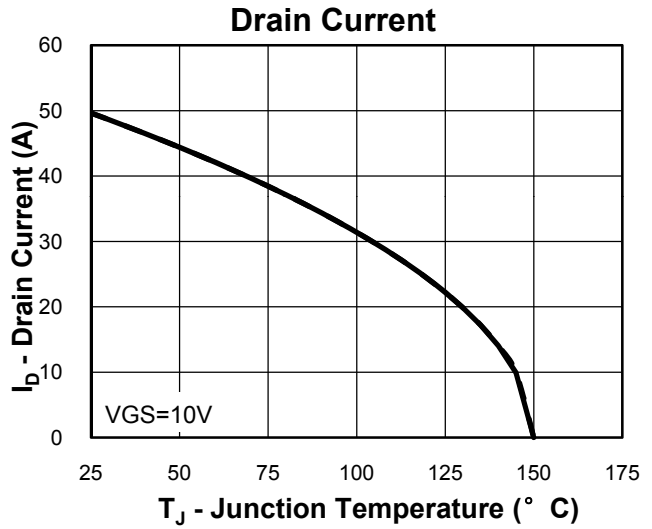
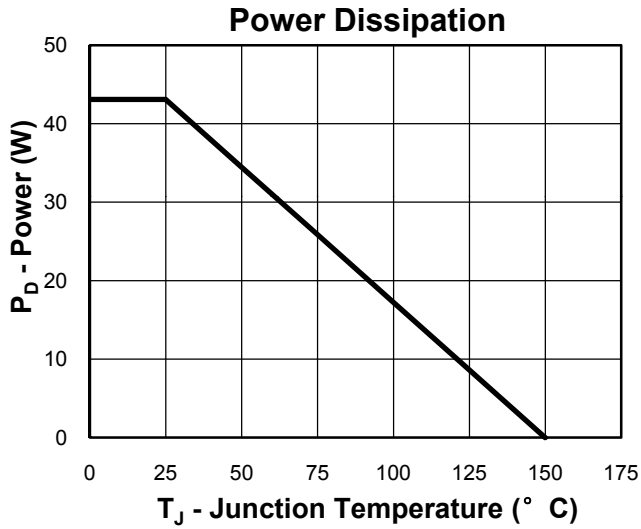
Symbol	Parameter	Test Condition	RU6051M			Unit
			Min.	Typ.	Max.	
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	60			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=60V, V_{GS}=0V$			1	$\mu A$
		$T_J=125^\circ\text{C}$			30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	1	2	3	V
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$			$\pm 100$	nA
$R_{DS(ON)}$ <sup>⑤</sup>	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=50A$		10	14	$m\Omega$
		$V_{GS}=4.5V, I_{DS}=35A$		12	18	$m\Omega$
<b>Diode Characteristics</b>						
$V_{SD}$ <sup>⑤</sup>	Diode Forward Voltage	$I_{SD}=50A, V_{GS}=0V$			1.2	V
$t_{rr}$	Reverse Recovery Time	$I_{SD}=50A, dI_{SD}/dt=100A/\mu s$		32		ns
$Q_{rr}$	Reverse Recovery Charge			39		nC
<b>Dynamic Characteristics</b> <sup>⑥</sup>						
$R_G$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$		1.6		$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=30V,$ Frequency=1.0MHz		1670		pF
$C_{oss}$	Output Capacitance			340		
$C_{rss}$	Reverse Transfer Capacitance			145		
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=30V, I_{DS}=50A,$ $V_{GEN}=10V, R_G=4.7\Omega$		10		ns
$t_r$	Turn-on Rise Time			86		
$t_{d(OFF)}$	Turn-off Delay Time			34		
$t_f$	Turn-off Fall Time			26		
<b>Gate Charge Characteristics</b> <sup>⑥</sup>						
$Q_g$	Total Gate Charge	$V_{DS}=48V, V_{GS}=10V,$ $I_{DS}=50A$		25		nC
$Q_{gs}$	Gate-Source Charge			9		
$Q_{gd}$	Gate-Drain Charge			8		

- 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  $T_{J\text{max}}$ ,  $I_{AS} = 16\text{A}$ ,  $V_{DD} = 48\text{V}$ ,  $R_G = 50\Omega$ , 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.

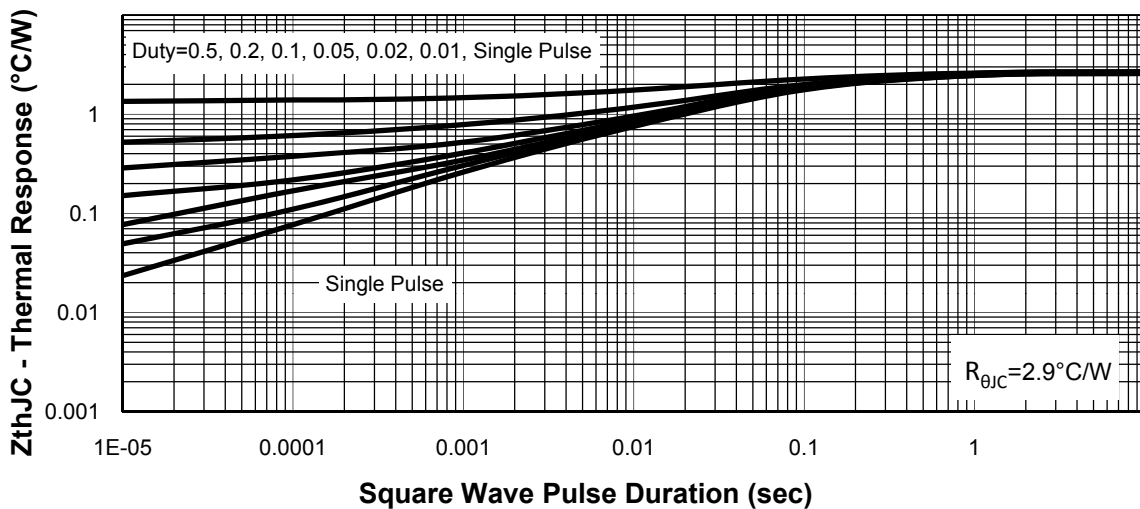
## Ordering and Marking Information

Device	Marking	Package	Packaging	Quantity	Reel Size	Tape width
RU6051M	RU6051M	PDFN5060	Tape&Reel	3000	13"	12mm

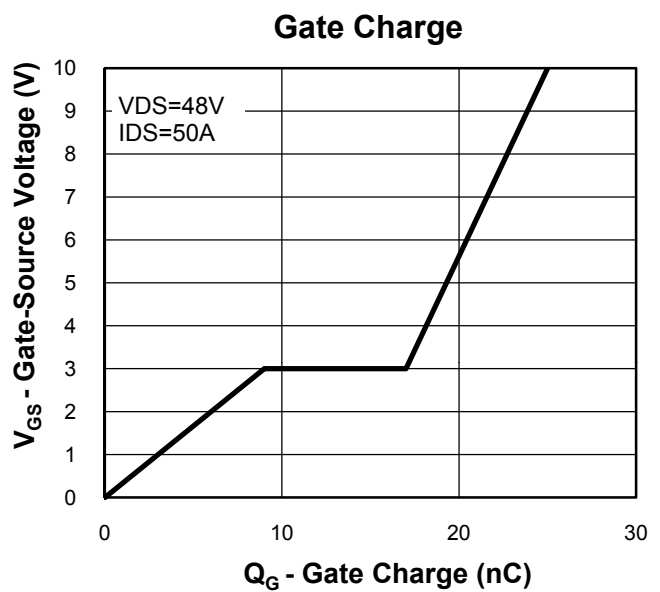
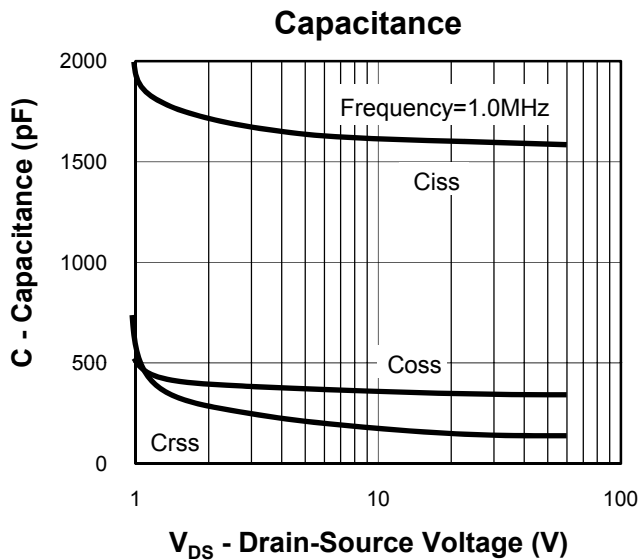
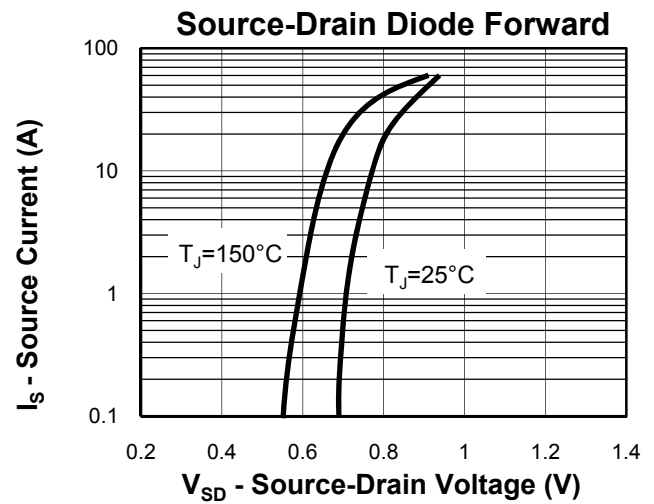
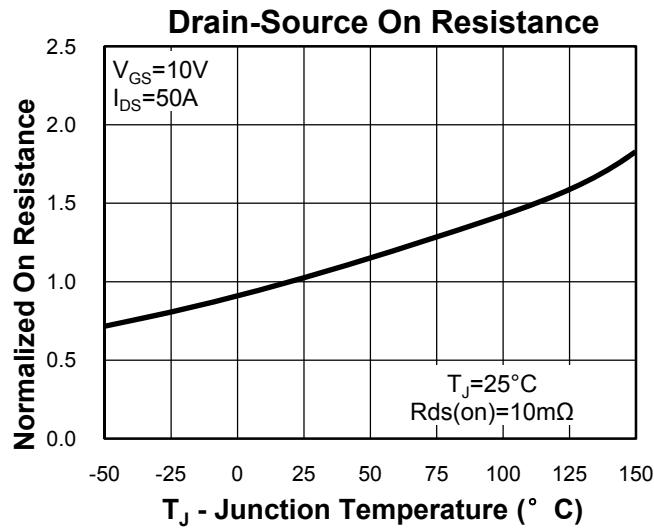
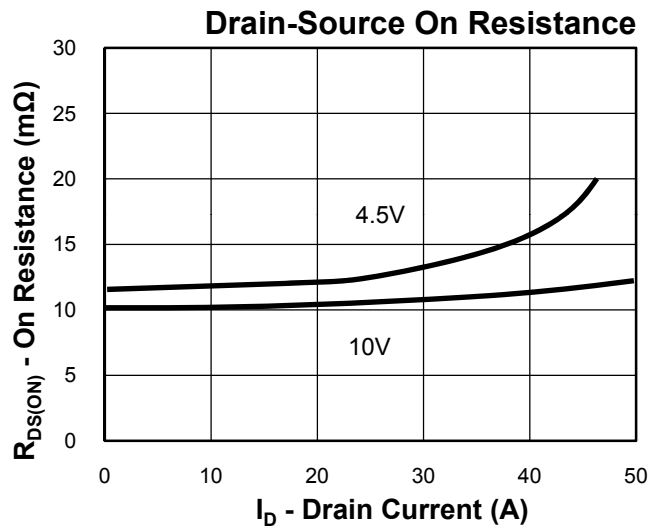
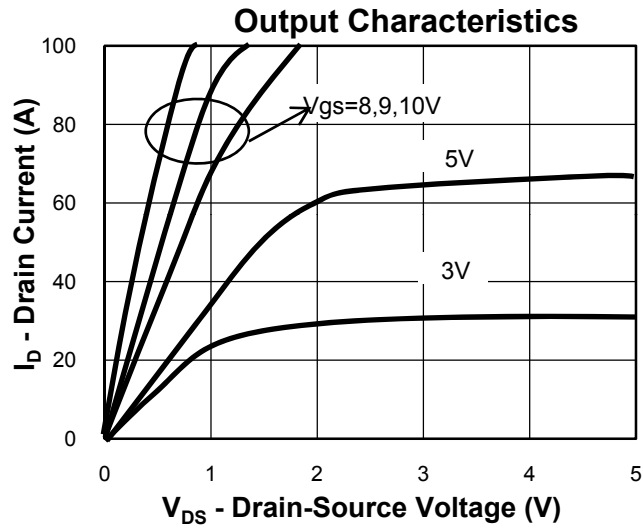
**Typical Characteristics**



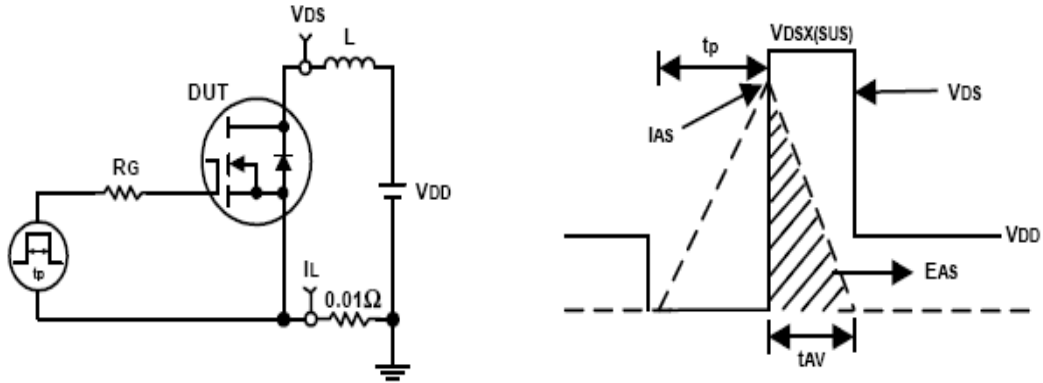
**Thermal Transient Impedance**



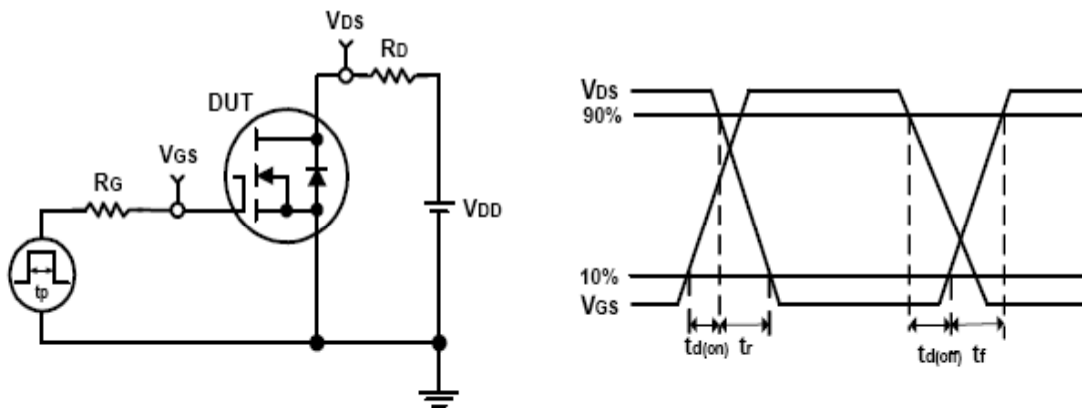
**Typical Characteristics**



**Avalanche Test Circuit and Waveforms**

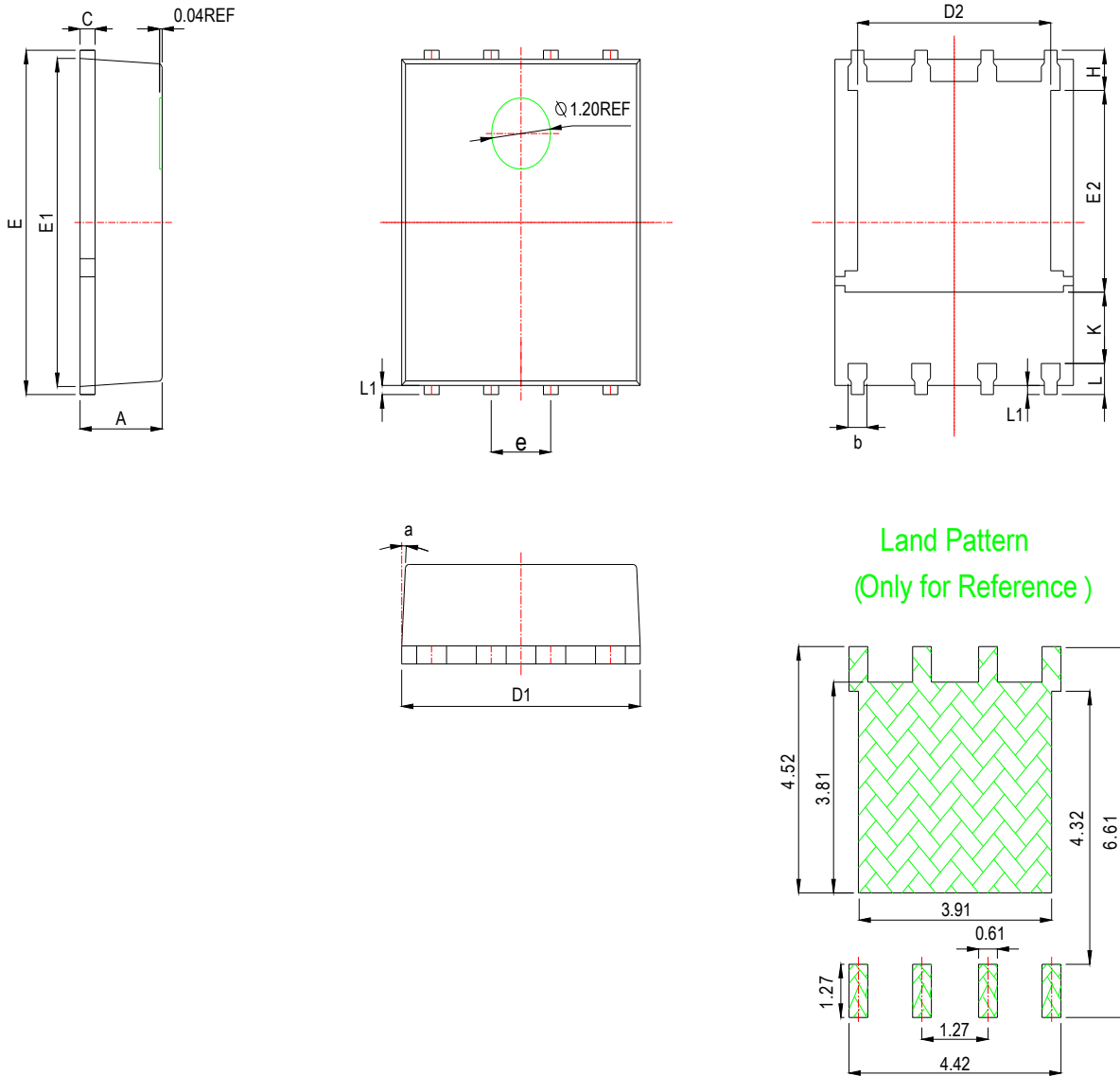


**Switching Time Test Circuit and Waveforms**



**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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