

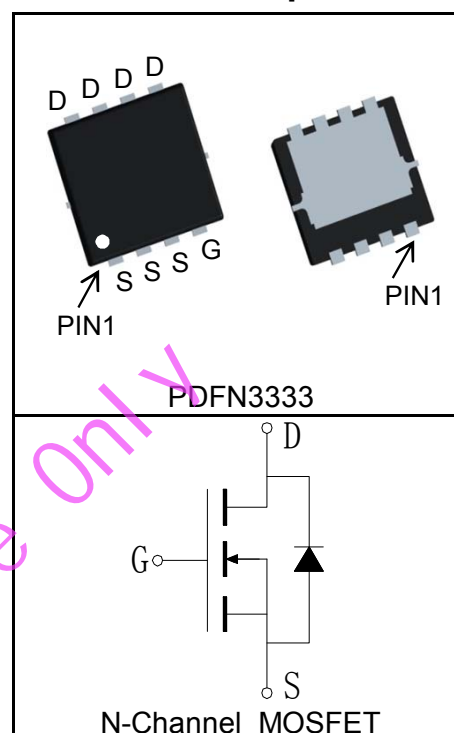
### Features

- 40V/40A,
- $R_{DS(ON)} = 5.5m\Omega(Typ.)@V_{GS}=10V$
- $R_{DS(ON)} = 8m\Omega(Typ.)@V_{GS}=4.5V$
- Ultra Low On-Resistance
- Fast Switching Speed
- 100% avalanche tested
- Lead Free and Green Devices Available (RoHS Compliant)

### Applications

- DC/DC Converters
- On board power for server
- Synchronous rectification

### 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	40	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	$T_C=25^\circ\text{C}$	40	A
<b>Mounted on Large Heat Sink</b>				
$I_{DP}^{①}$	300 $\mu\text{s}$ Pulse Drain Current Tested	$T_C=25^\circ\text{C}$	160	A
$I_D^{②}$	Continuous Drain Current@ $T_C(V_{GS}=10V)$	$T_C=25^\circ\text{C}$	40	A
		$T_C=100^\circ\text{C}$	25	
	Continuous Drain Current@ $T_A(V_{GS}=10V)^{③}$	$T_A=25^\circ\text{C}$	18	
		$T_A=70^\circ\text{C}$	14	
$P_D$	Maximum Power Dissipation@ $T_C$	$T_C=25^\circ\text{C}$	34	W
		$T_C=100^\circ\text{C}$	13	
	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	3.72	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}^{(3)}$	Thermal Resistance-Junction to Ambient	30	$^{\circ}\text{C}/\text{W}$
<b>Drain-Source Avalanche Ratings</b>			
$E_{AS}^{(4)}$	Avalanche Energy, Single Pulsed	42	mJ

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

Symbol	Parameter	Test Condition	RUH4040M2			Unit
			Min.	Typ.	Max.	
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu\text{A}$	40			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=40V, V_{GS}=0V$			1	$\mu\text{A}$
		$T_J=125^{\circ}\text{C}$			30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu\text{A}$	1		2	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	$V_{GS}=4.5V, I_{DS}=30A$		8	11	$\text{m}\Omega$
		$V_{GS}=10V, I_{DS}=40A$		5.5	6.5	$\text{m}\Omega$
<b>Diode Characteristics</b>						
$V_{SD}^{(5)}$	Diode Forward Voltage	$I_{SD}=40A, V_{GS}=0V$			1.2	V
$t_{rr}$	Reverse Recovery Time	$I_{SD}=40A, di_{SD}/dt=100A/\mu\text{s}$		9		ns
$Q_{rr}$	Reverse Recovery Charge			15		nC
<b>Dynamic Characteristics</b> <sup>(6)</sup>						
$R_G$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$		1.3		$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=20V,$ Frequency=1.0MHz		580		pF
$C_{oss}$	Output Capacitance			130		
$C_{rss}$	Reverse Transfer Capacitance			65		
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=20V, I_{DS}=40A,$ $V_{GEN}=10V, R_G=4.7\Omega$		5		ns
$t_r$	Turn-on Rise Time			24		
$t_{d(OFF)}$	Turn-off Delay Time			35		
$t_f$	Turn-off Fall Time			12		
<b>Gate Charge Characteristics</b> <sup>(6)</sup>						
$Q_g$	Total Gate Charge	$V_{DS}=32V, V_{GS}=10V,$ $I_{DS}=40A$		24		nC
$Q_{gs}$	Gate-Source Charge			5		
$Q_{gd}$	Gate-Drain Charge			3.5		

**Notes:**

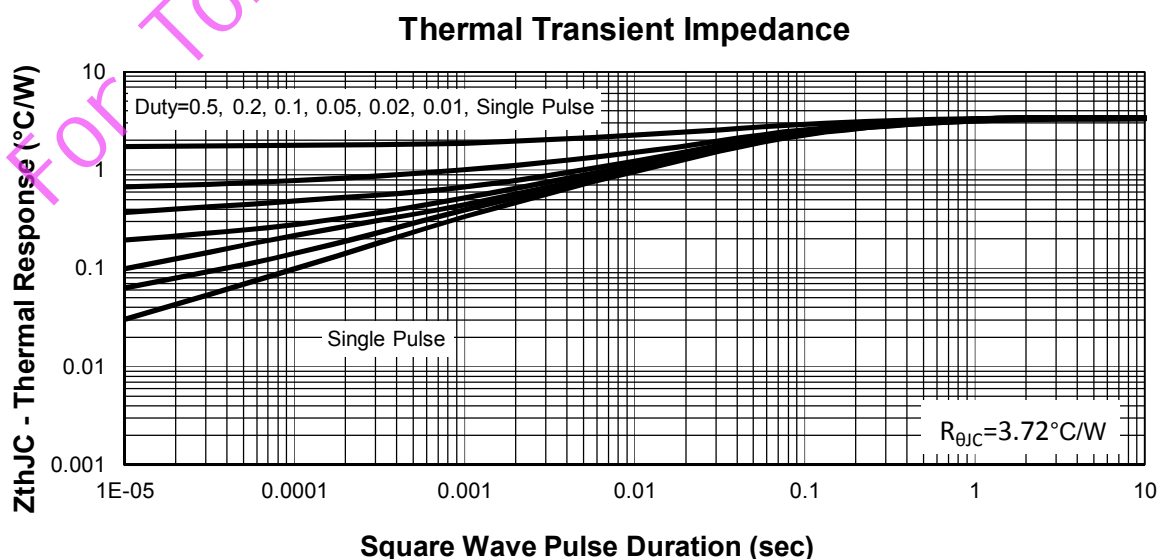
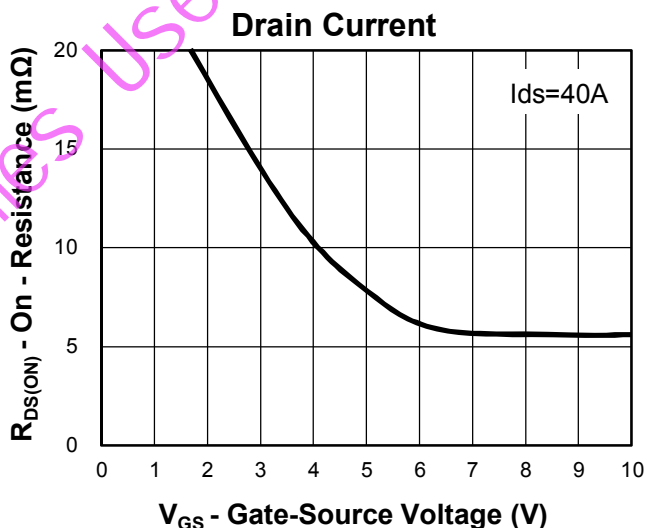
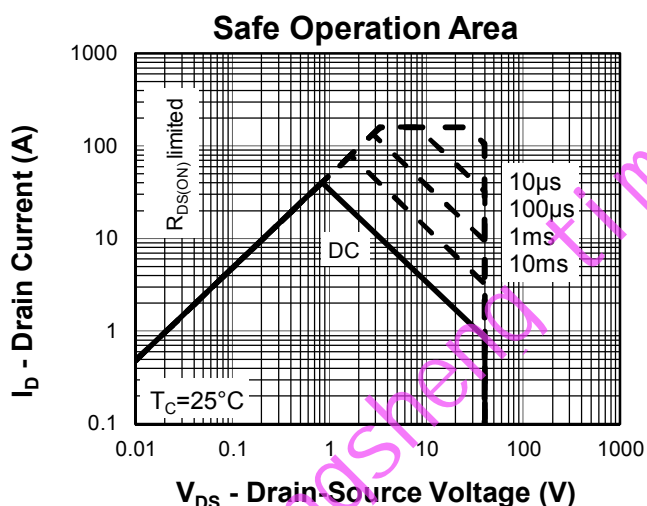
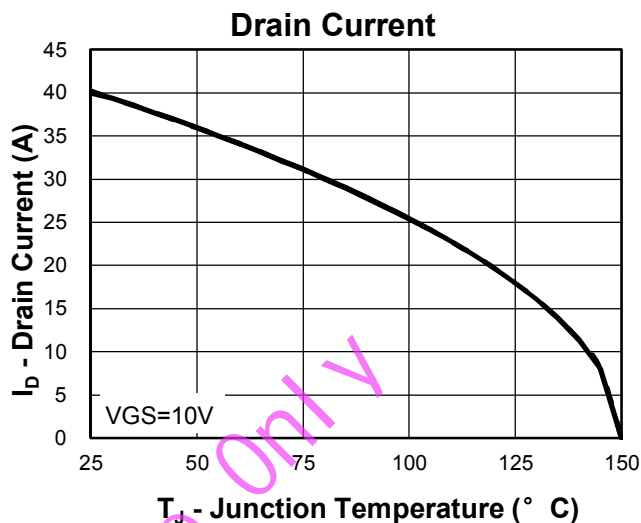
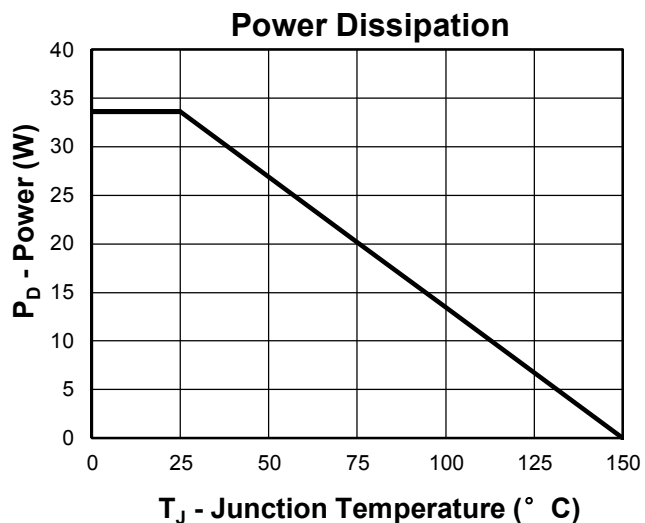
- ① Max current is limited by the source bonding.
- ② Pulse width limited by safe operating area.
- ③ When mounted on 1 inch square copper board, t 10sec.
- ④ Limited by TJmax, IAS =13A, VDD =24V, RG = 50Ω , Starting TJ = 25° C.
- ⑤ Pulse test ; Pulse width300s, duty cycle2%.
- ⑥ Guaranteed by design, not subject to production testing.

**Ordering and Marking Information**

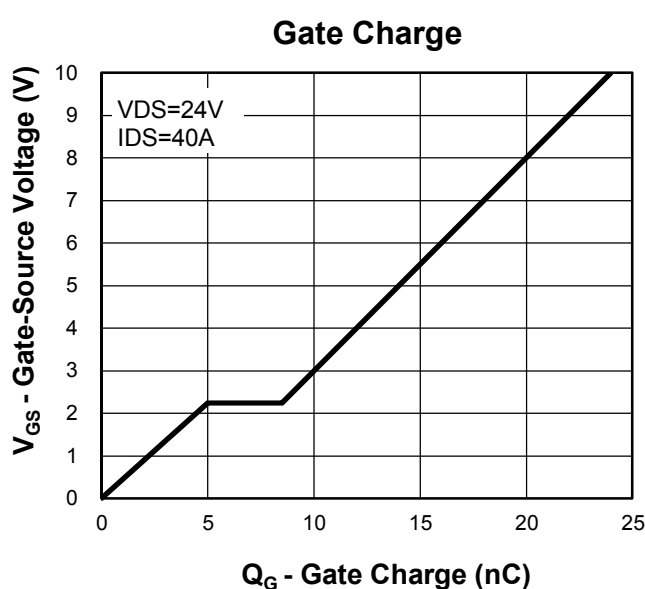
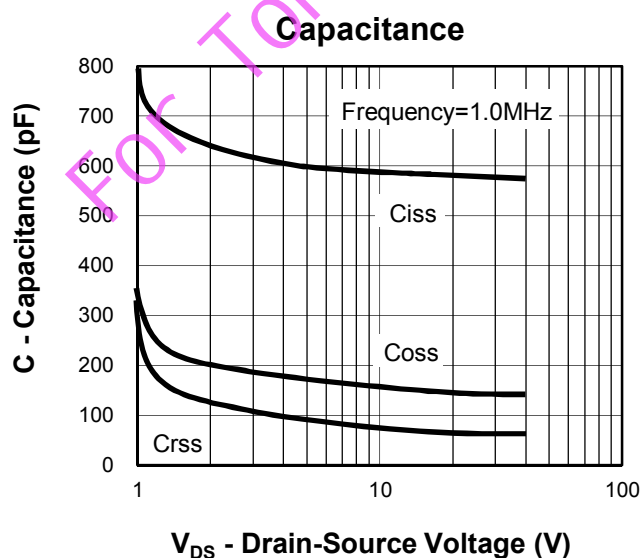
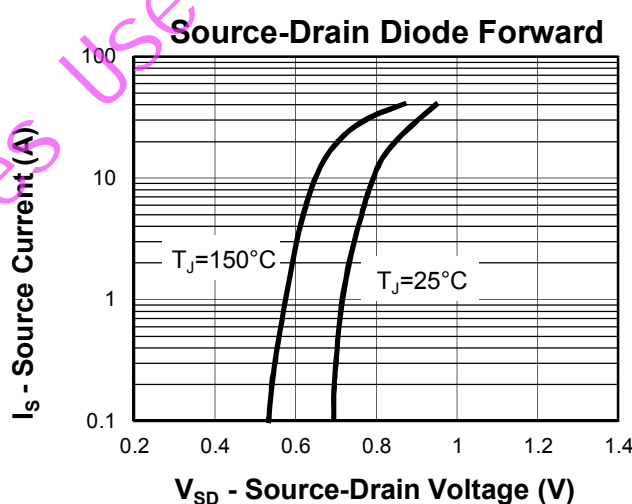
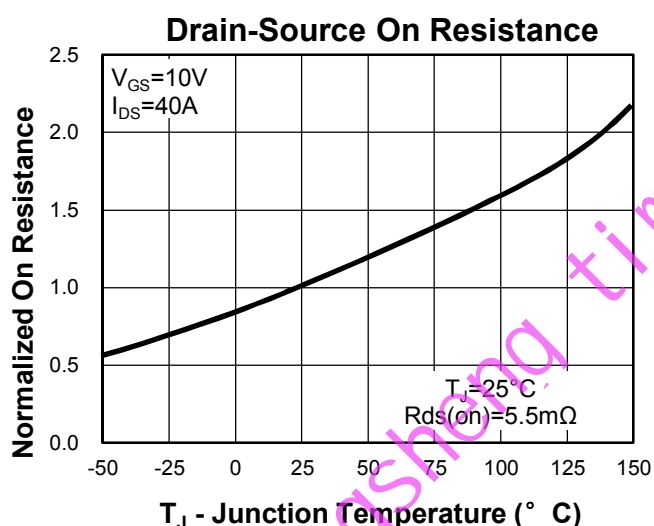
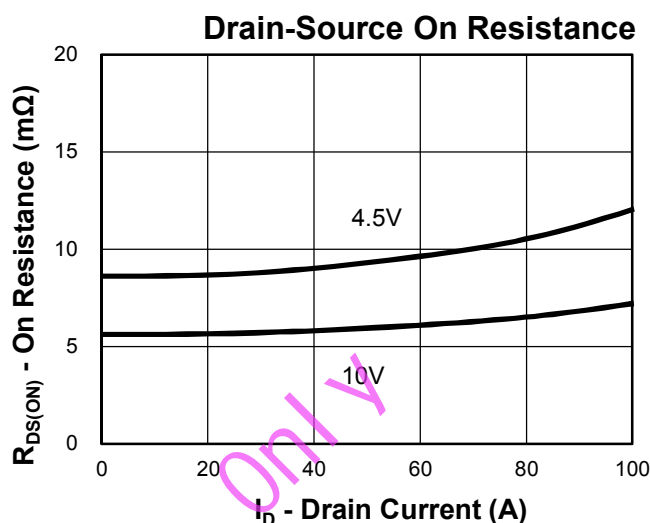
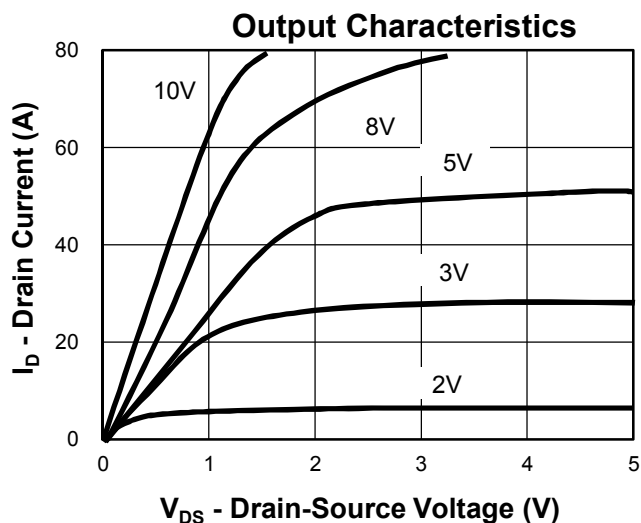
Device	Marking	Package	Packaging	Quantity	Reel Size	Tape width
RUH4040M2	4040	PDFN3333	Tape&Reel	5000	13"	12mm

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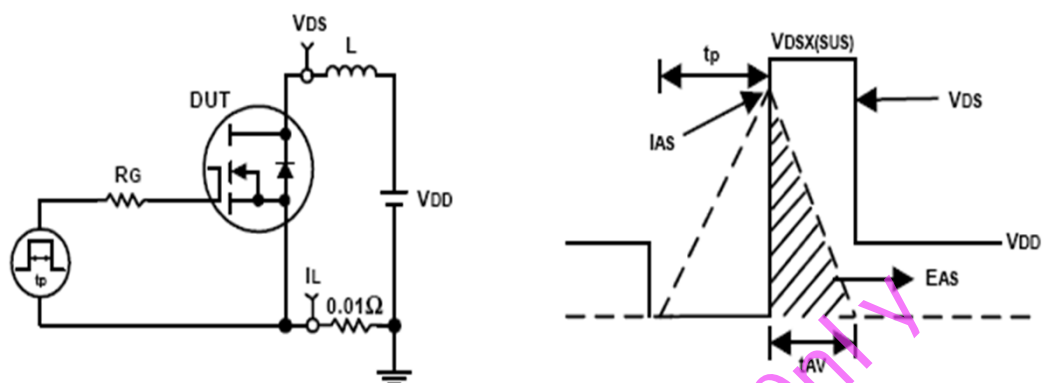
### Typical Characteristics



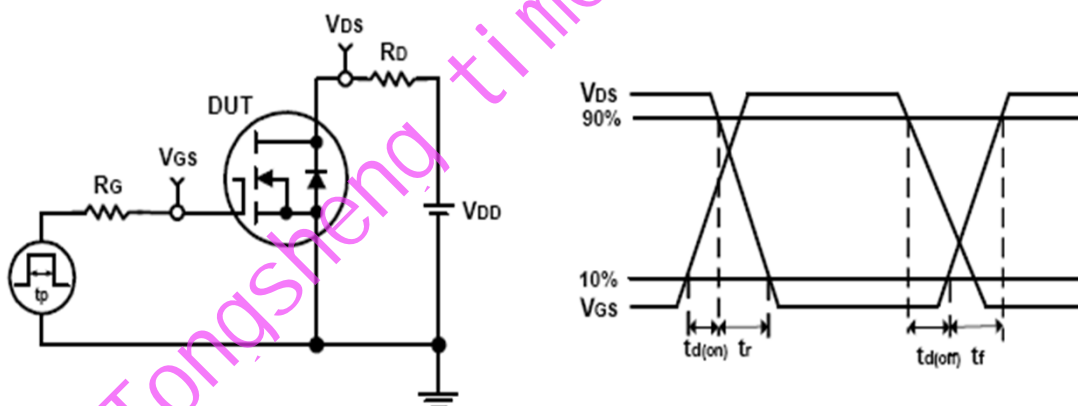
### Typical Characteristics



**Avalanche Test Circuit and Waveforms**

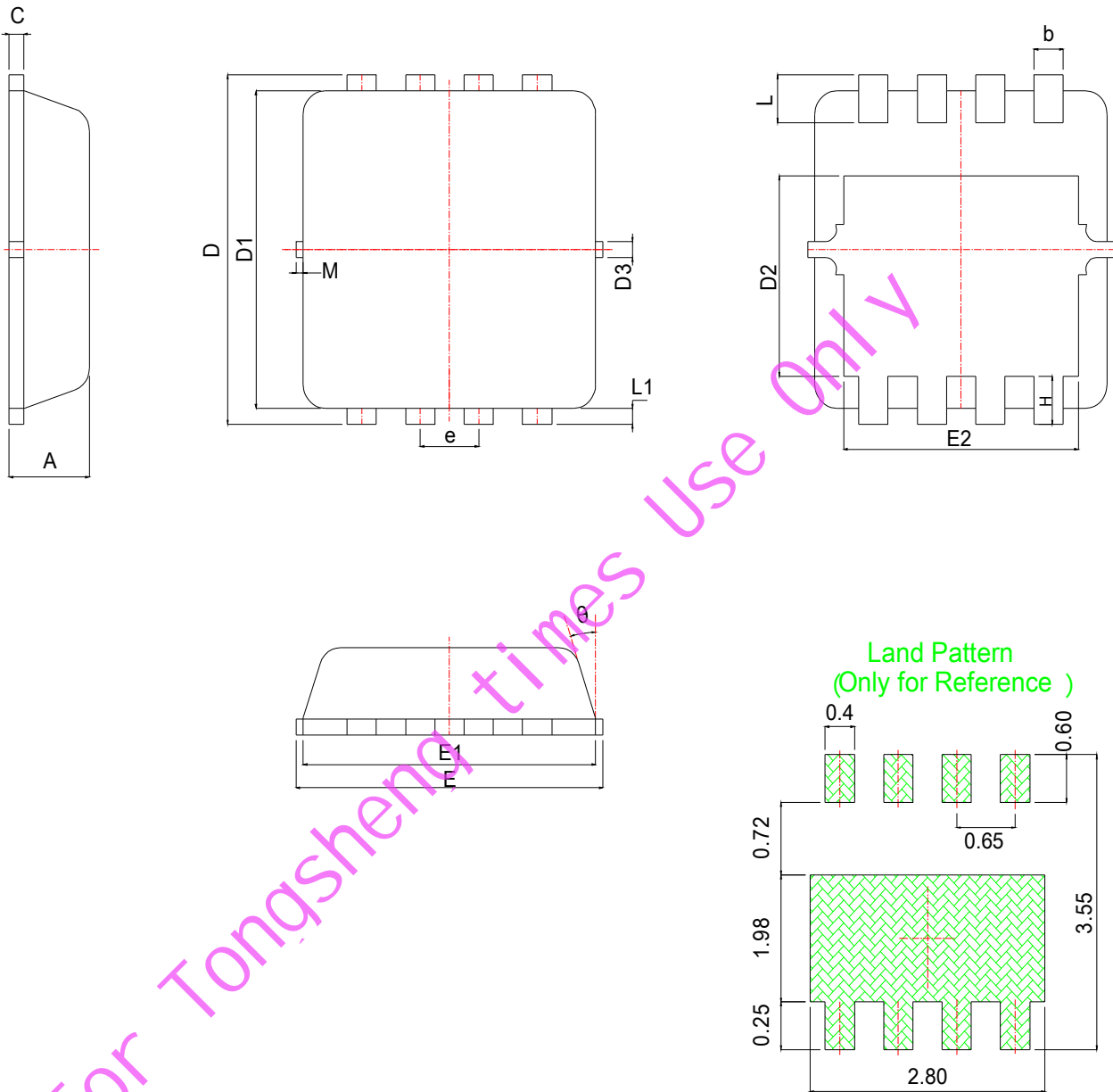


**Switching Time Test Circuit and Waveforms**



**Package Information**

**PDFN3333**



SYMBOL	MM			INCH			SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX		MIN	NOM	MAX	MIN	NOM	MAX
A	0.70	0.75	0.80	0.028	0.030	0.031	E1	3.00	3.15	3.20	0.118	0.122	0.126
b	0.25	0.30	0.35	0.010	0.012	0.014	E2	2.39	2.49	2.59	0.094	0.098	0.102
c	0.10	0.15	0.25	0.004	0.007	0.010	e	0.65BSC			0.026BSC		
D	3.25	3.35	3.45	0.128	0.132	0.136	H	0.30	0.40	0.50	0.012	0.016	0.020
D1	3.00	3.10	3.20	0.118	0.122	0.126	L	0.30	0.40	0.50	0.012	0.016	0.020
D2	1.78	1.88	1.98	0.070	0.074	0.078	L1	*	0.13	*	*	0.005	*
D3	*	0.13	*	*	0.005	*	θ	*	10°	12°	*	10°	12°
E	3.20	3.30	3.40	0.126	0.130	0.134	M	*	*	0.15	*	*	0.006

## Customer Service

**Worldwide Sales and Service:**

Sales@ruichips.com

**Technical Support:**

Technical@ruichips.com

**Investor Relations Contacts:**

Investor@ruichips.com

**Marcom Contact:**

Marcom@ruichips.com

**Editorial Contact:**

Editorial@ruichips.com

**HR Contact:**

HR@ruichips.com

**Legal Contact:**

Legal@ruichips.com

**Shen Zhen RUICHIPS Semiconductor CO., LTD**

4th Floor, Block 8, Changyuan New Material Port, Keyuan Middle Road, Science & Industry Park,  
Nanshan District, Shenzhen, CHINA

**TEL:** (86-755) 8311-5334

**FAX:** (86-755) 8311-4278

**E-mail:** Sales-SZ@ruichips.com

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