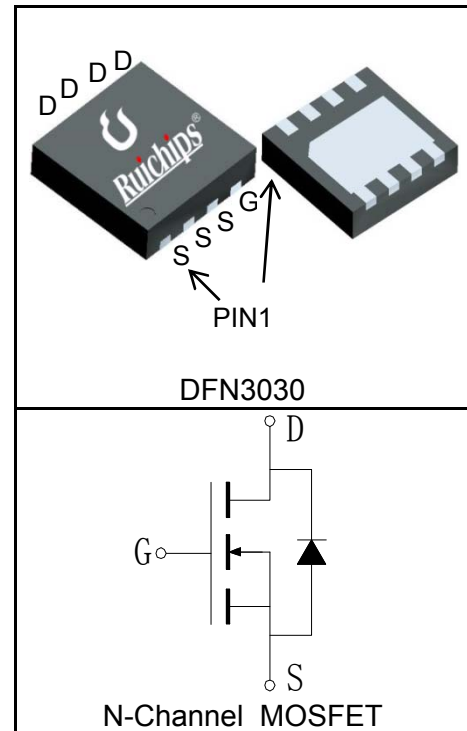


Features

- 40V/40A,
- $R_{DS(ON)} = 5\text{m}\Omega(\text{Typ.})@V_{GS}=10\text{V}$
- $R_{DS(ON)} = 6.5\text{m}\Omega(\text{Typ.})@V_{GS}=4.5\text{V}$
- Ultra Low On-Resistance
- Uses Ruichips advanced RUISGT™ technology
- 100% avalanche tested
- Lead Free and Green Devices Available (RoHS Compliant)



Pin Description



Applications

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

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit	
Common Ratings ($T_C=25^\circ\text{C}$ Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage	40	V	
V_{GSS}	Gate-Source Voltage	± 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
Mounted on Large Heat Sink				
$I_{DP}^{①}$	300 μs Pulse Drain Current Tested	$T_C=25^\circ\text{C}$	160	A
$I_D^{②}$	Continuous Drain Current@ $T_C(V_{GS}=10\text{V})$	$T_C=25^\circ\text{C}$	40	A
		$T_C=100^\circ\text{C}$	25	
	Continuous Drain Current@ $T_A(V_{GS}=10\text{V})^{③}$	$T_A=25^\circ\text{C}$	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	°C/W
$R_{\theta JA}^{(3)}$	Thermal Resistance-Junction to Ambient	35	°C/W
Drain-Source Avalanche Ratings			
$E_{AS}^{(4)}$	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.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	40			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=40V, V_{GS}=0V$			1	μA
		$T_J=125^\circ\text{C}$			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	$V_{GS}=\pm 20V, V_{DS}=0V$			± 100	nA
$R_{DS(ON)}^{(5)}$	Drain-Source On-state Resistance	$V_{GS}=4.5V, I_{DS}=20A$		6.5	9	$m\Omega$
		$V_{GS}=10V, I_{DS}=20A$		5	6.5	$m\Omega$
		$T_J=150^\circ\text{C}$		7.9	10.3	$m\Omega$
Diode Characteristics						
$V_{SD}^{(5)}$	Diode Forward Voltage	$I_{SD}=40A, V_{GS}=0V$			1.2	V
gfs	Transconductance	$V_{DS}=5V, I_{DS}=40A$		90		S
t_{rr}	Reverse Recovery Time	$I_{SD}=40A, dI_{SD}/dt=100A/\mu s$		16		ns
Q_{rr}	Reverse Recovery Charge			7		nC
Dynamic Characteristics ⁽⁶⁾						
R_G	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$		0.7		Ω
C_{iss}	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=20V,$ Frequency=1.0MHz		1520		pF
C_{oss}	Output Capacitance			346		
C_{riss}	Reverse Transfer Capacitance			53		
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=20V, I_{DS}=40A,$ $V_{GEN}=10V, R_G=4.7\Omega$		9		ns
t_r	Turn-on Rise Time			80		
$t_{d(OFF)}$	Turn-off Delay Time			19		
t_f	Turn-off Fall Time			3		
Gate Charge Characteristics ⁽⁶⁾						
Q_g	Total Gate Charge	$V_{DS}=32V, V_{GS}=10V,$ $I_{DS}=40A$		25		nC
Q_{gs}	Gate-Source Charge			7		
Q_{gd}	Gate-Drain Charge			3		

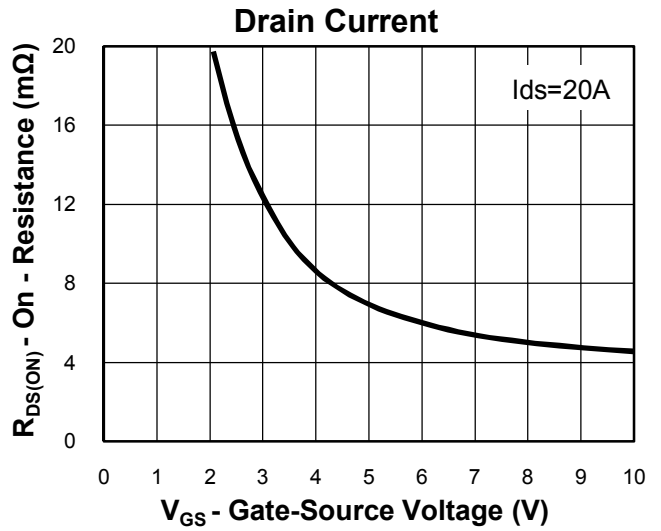
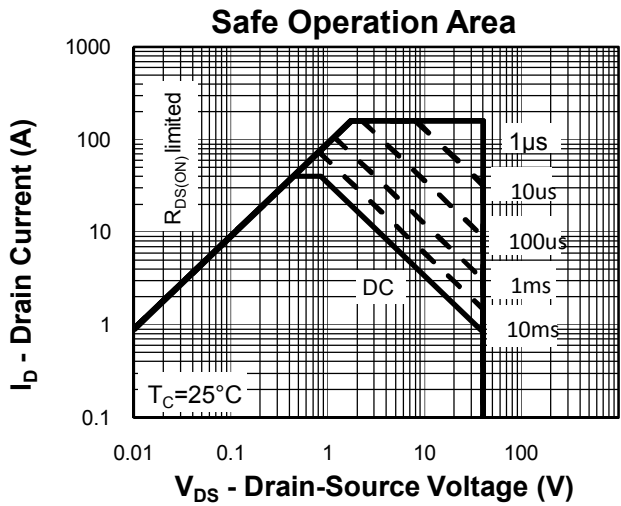
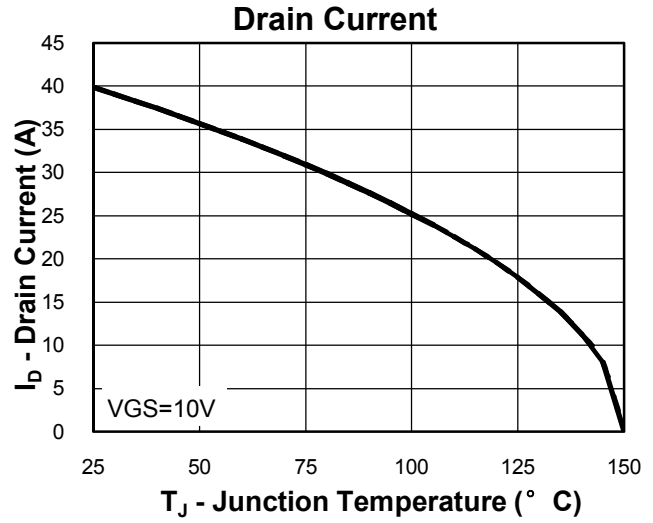
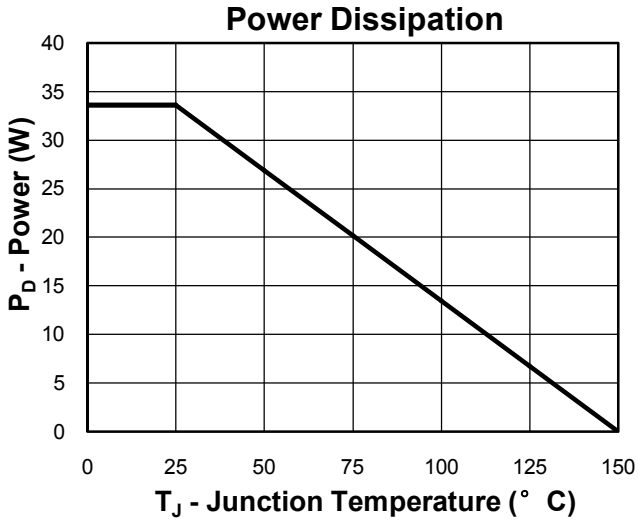
Notes:

- 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 =32V, RG = 50Ω , Starting TJ = 25° C.
- ⑤ Pulse test ; Pulse width300s, duty cycle2%.
- ⑥ Guaranteed by design, not subject to production testing.

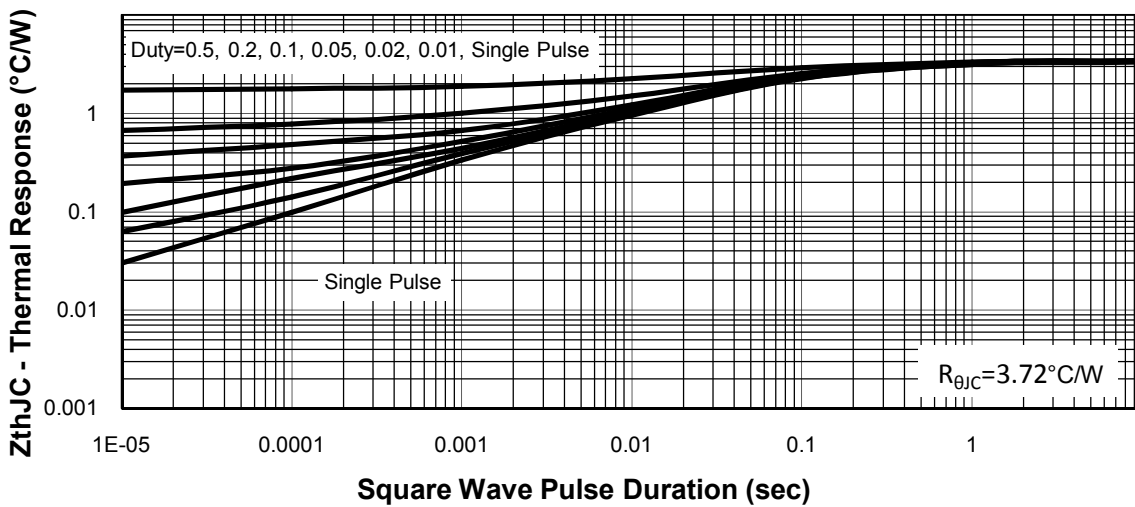
Ordering and Marking Information

Device	Marking	Package	Packaging	Quantity	Reel Size	Tape width
RUH4040M2	RUH4040	DFN3030	Tape&Reel	5000	13"	12mm

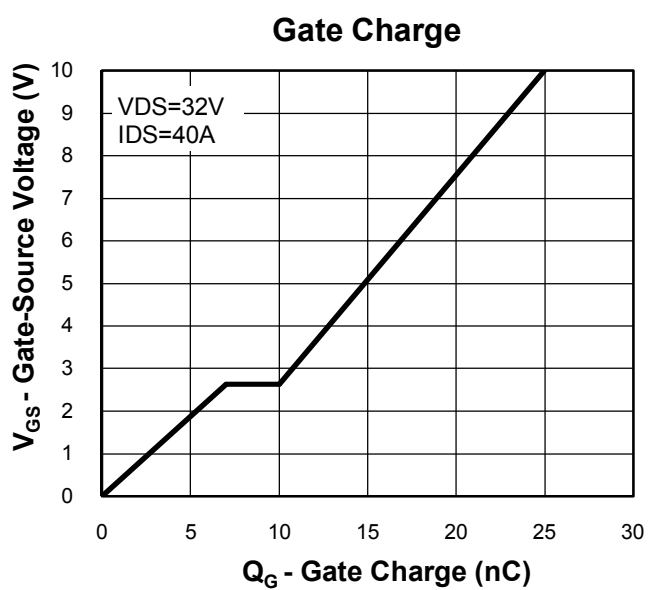
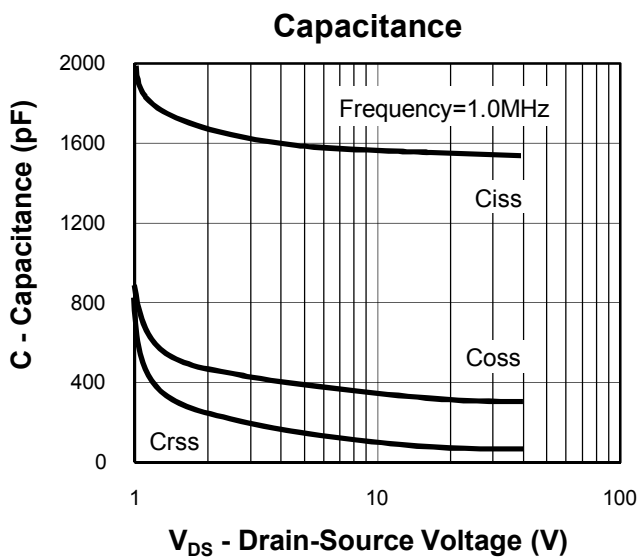
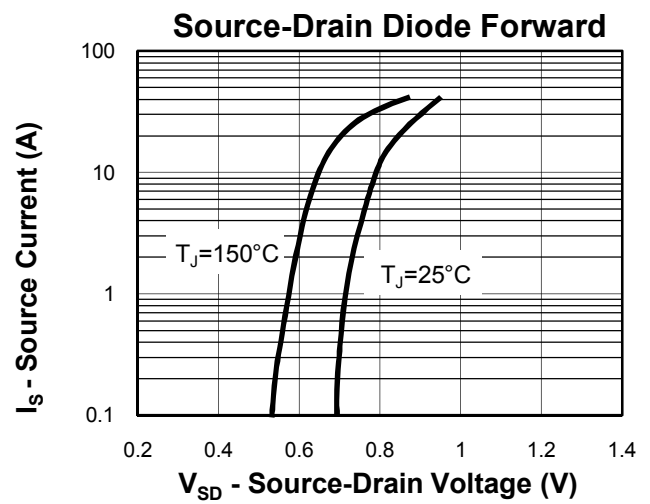
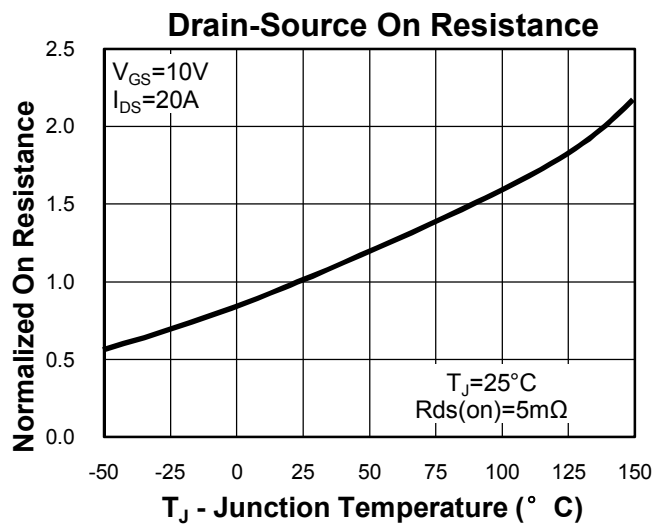
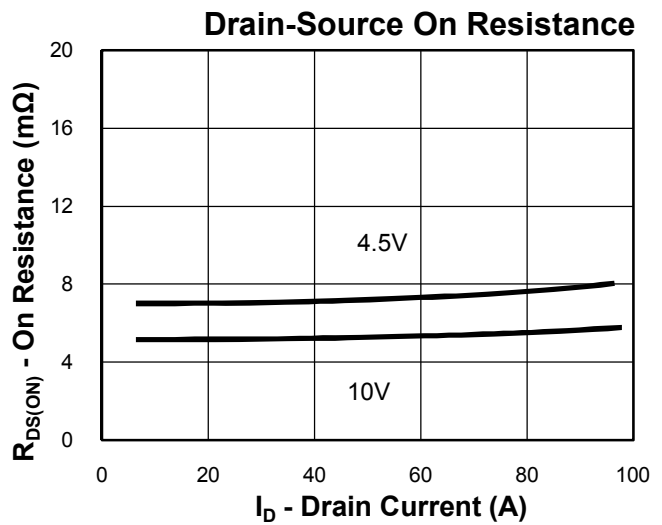
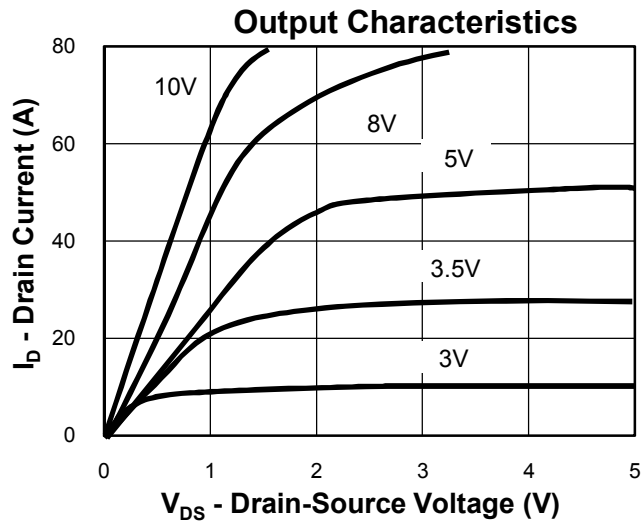
Typical Characteristics



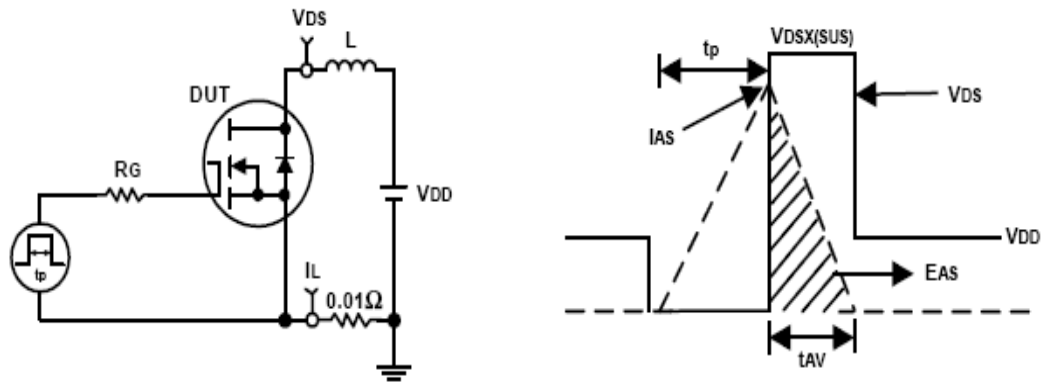
Thermal Transient Impedance



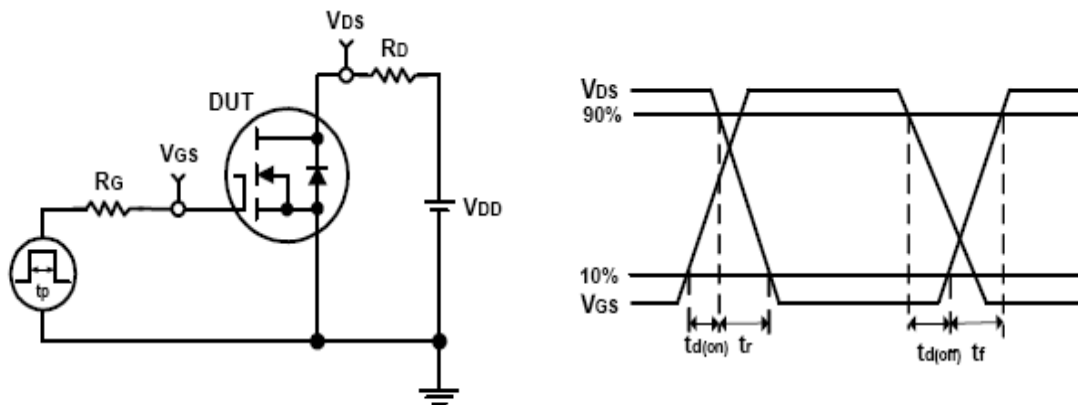
Typical Characteristics



Avalanche Test Circuit and Waveforms

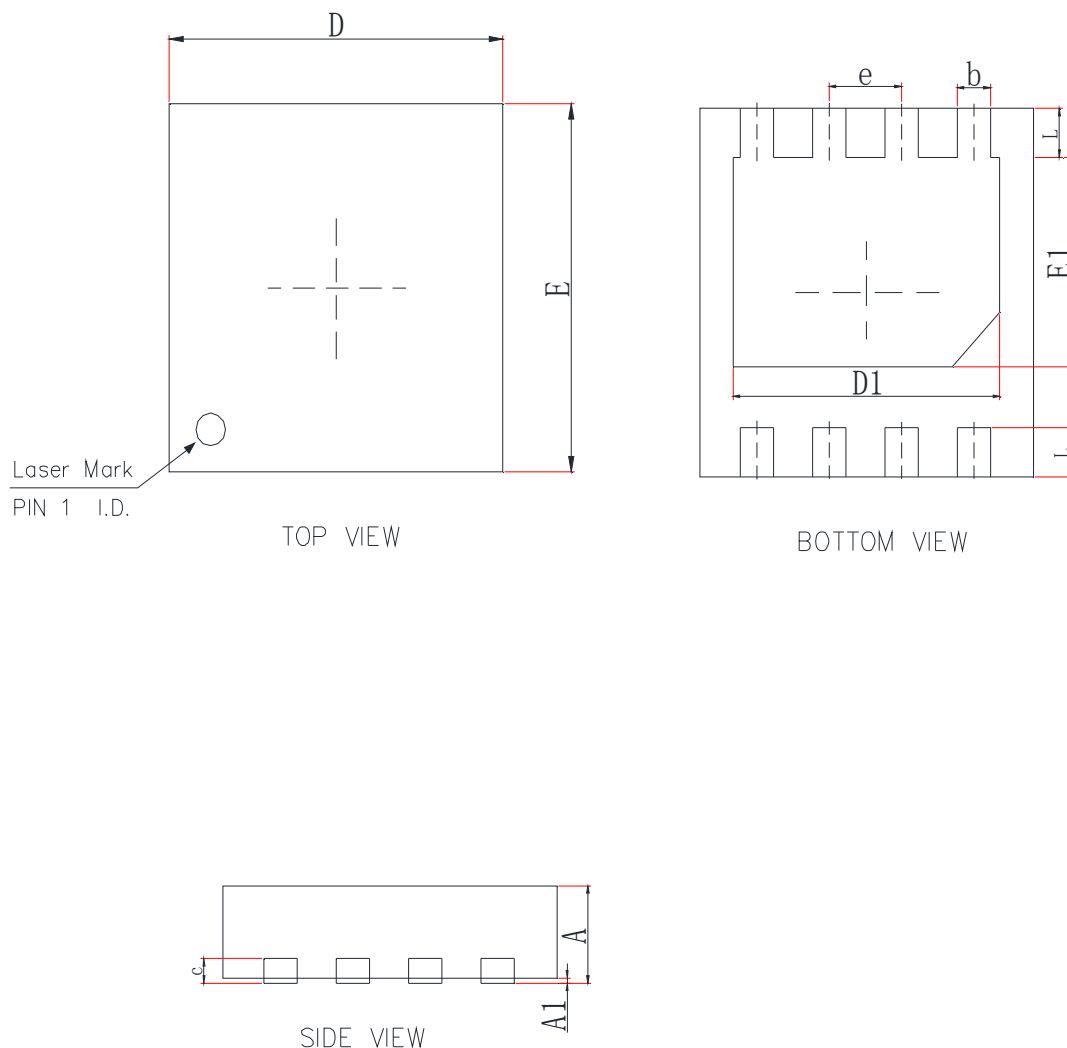


Switching Time Test Circuit and Waveforms



Package Information

DFN3030



SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.70	0.75	0.80	0.028	0.030	0.031
A1			0.05			0.002
b	0.25	0.30	0.40	0.010	0.012	0.016
c	0.10	0.20	0.30	0.004	0.008	0.012
D	2.90	3.00	3.15	0.114	0.118	0.124
E	2.90	3.00	3.15	0.114	0.118	0.124
D1	2.30	2.40	2.50	0.091	0.094	0.098
E1	1.70	1.80	1.90	0.067	0.071	0.075
L	0.30	0.40	0.50	0.012	0.016	0.020
e	0.65 BSC			0.026 BSC		