Ruichips®

RUH4040M2

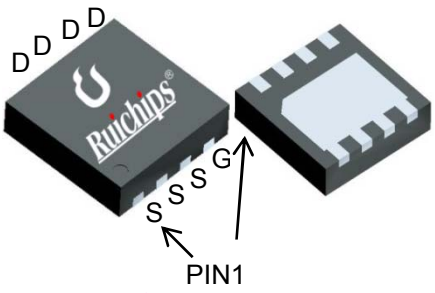
N-Channel Advanced Power MOSFET

Features

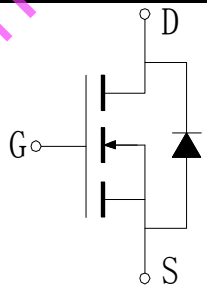
• 40V/40A,
$R_{DS\ (ON)}$ =5mΩ(Typ.)@V_{GS}=10V
$R_{DS\ (ON)}$ =6.5mΩ(Typ.)@V_{GS}=4.5V
• Ultra Low On-Resistance
• Uses Ruichips advanced RUISGT™ technology
• 100% avalanche tested
• Lead Free and Green Devices Available (RoHS Compliant)

Pb-Free RoHS HF Halogen-Free

Pin Description



DFN3030



N-Channel MOSFET

Applications

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

Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
Common Ratings (T_C=25°C Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage		40	V
V_{GSS}	Gate-Source Voltage		±20	
T_J	Maximum Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-55 to 150	°C
I_S	Diode Continuous Forward Current	T_C=25°C	40	A
Mounted on Large Heat Sink				
I_{DP}①	300μs Pulse Drain Current Tested	T_C=25°C	160	A
I_D②	Continuous Drain Current@T_C(V_{GS}=10V)	T_C=25°C	40	A
		T_C=100°C	25	
	Continuous Drain Current@T_A(V_{GS}=10V)③	T_A=25°C	18	
		T_A=70°C	14	
P_D	Maximum Power Dissipation@T_C	T_C=25°C	34	W
		T_C=100°C	13	
	Maximum Power Dissipation@T_A③	T_A=25°C	4.2	
		T_A=70°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°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}=250μA	40			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=40V, V_{GS}=0V			1	μA
		T_J=125°C			30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	1		2.5	V
I_{GSS}	Gate Leakage Current	V_{GS}=±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	mΩ
		V_{GS}=10V, I_{DS}=20A		5	6.5	mΩ
		Tj=150°C		7.9	10.3	mΩ
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/μs		16		ns
Q_{rr}	Reverse Recovery Charge			7		nC
Dynamic Characteristics ⑥						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz		0.7		Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=20V, Frequency=1.0MHz		1520		pF
C_{oss}	Output Capacitance			346		
C_{rss}	Reverse Transfer Capacitance			53		
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=20V,I_{DS}=40A, V_{GEN}=10V,R_G=4.7Ω		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:

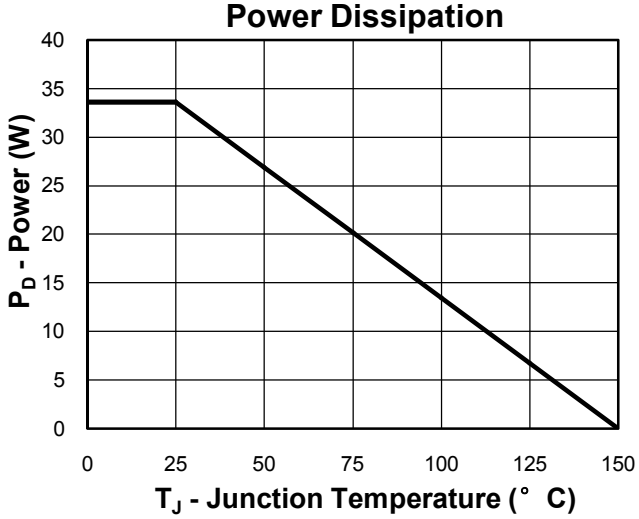
① Max current is limited by the source bonding.
② Pulse width limited by safe operating area.
③ When mounted on 1 inch square copper board, t 10sec.
④ Limited by TJmax, IAS =13A, VDD =32V, RG = 50Ω , Starting TJ = 25° C.
⑤ Pulse test ; Pulse width300s, duty cycle2%.
⑥ Guaranteed by design, not subject to production testing.

Ordering and Marking Information

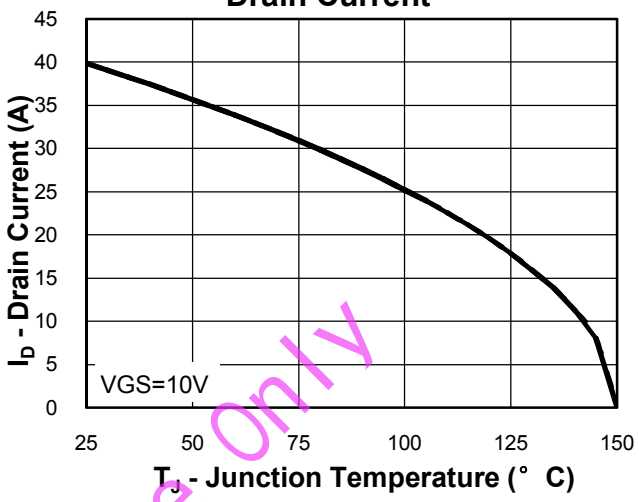
Device	Marking	Package	Packaging	Quantity	Reel Size	Tape width
RUH4040M2	RUH4040	DFN3030	Tape&Reel	5000	13"	12mm

Typical Characteristics

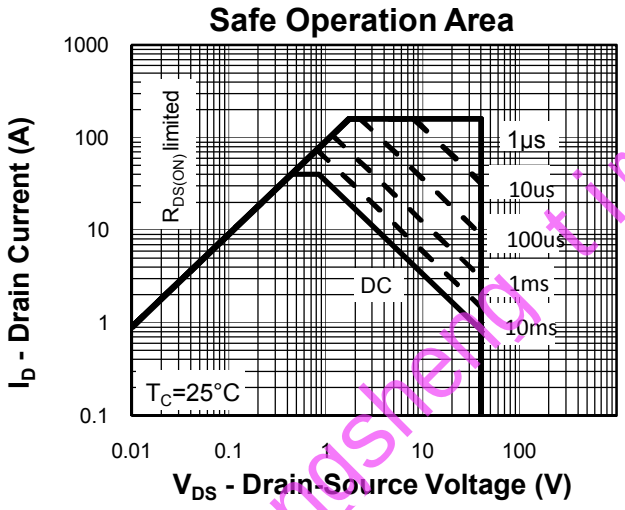
Power Dissipation



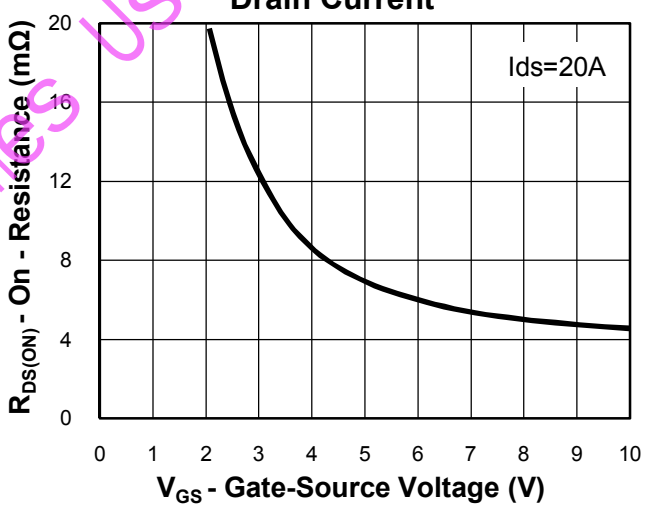
Drain Current



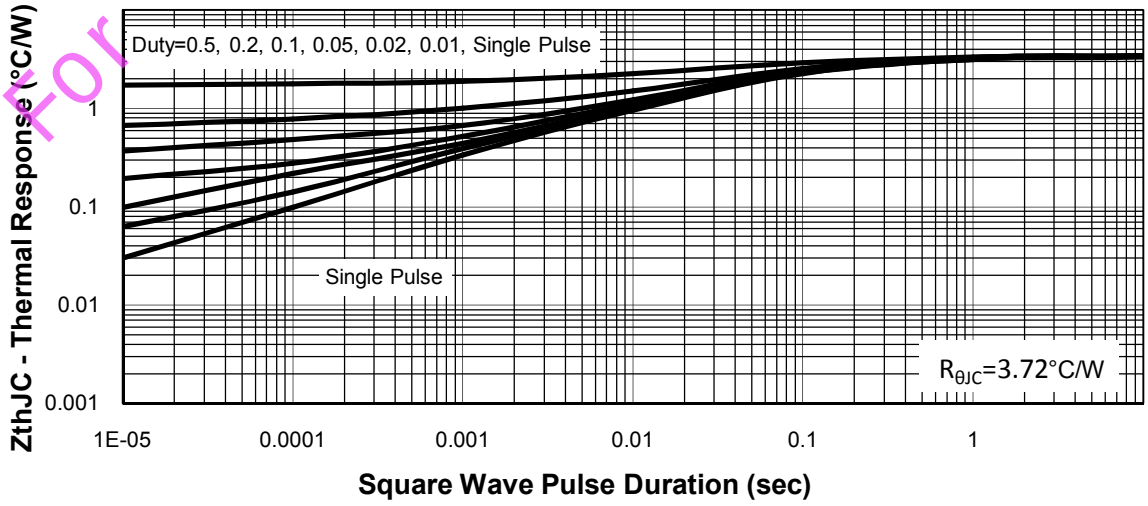
Safe Operation Area



Drain Current

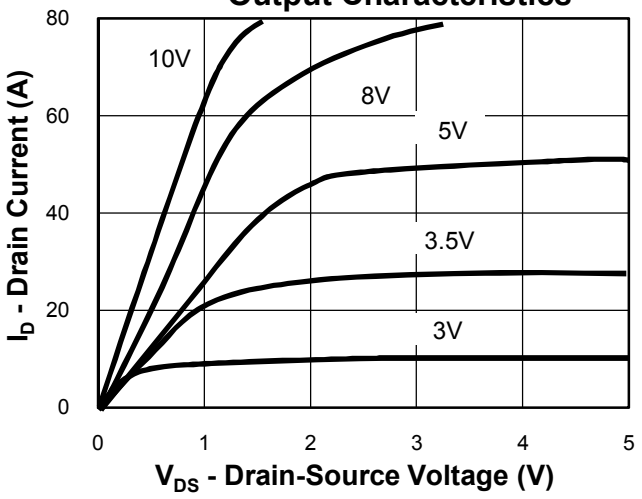


Thermal Transient Impedance

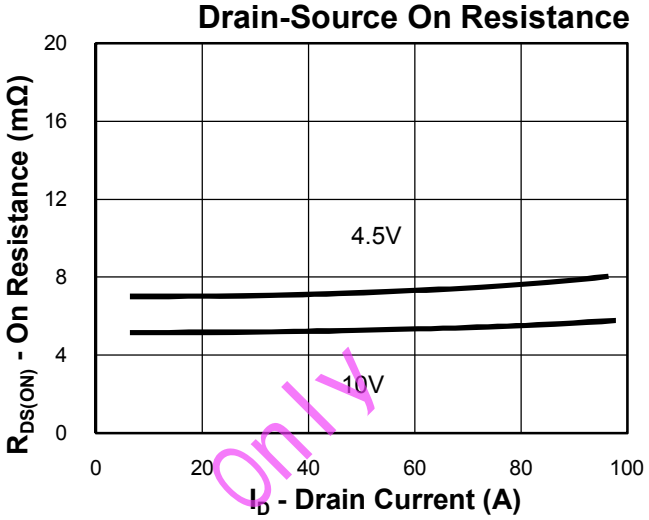


Typical Characteristics

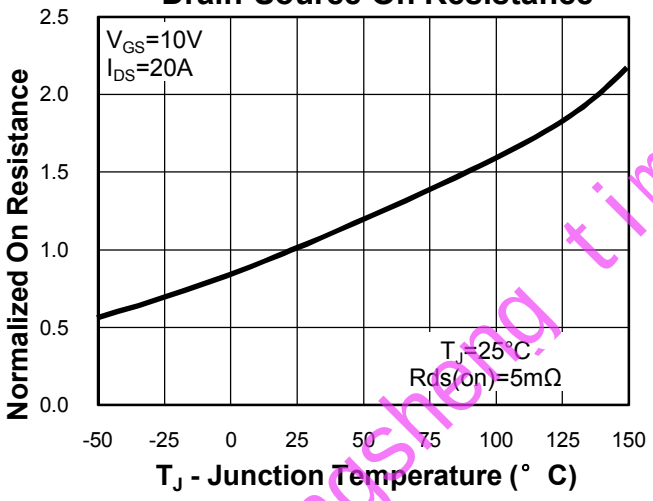
Output Characteristics



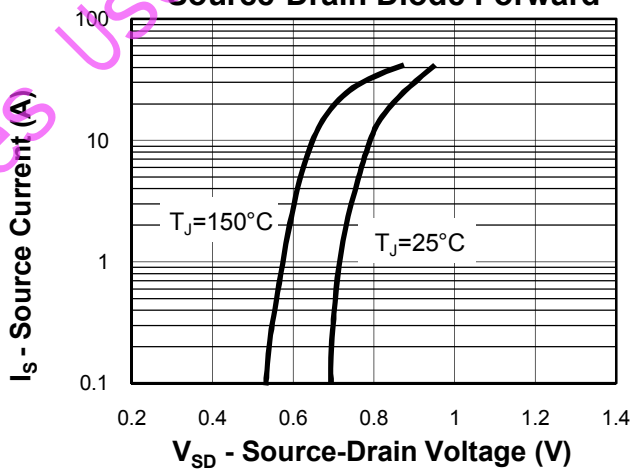
Drain-Source On Resistance



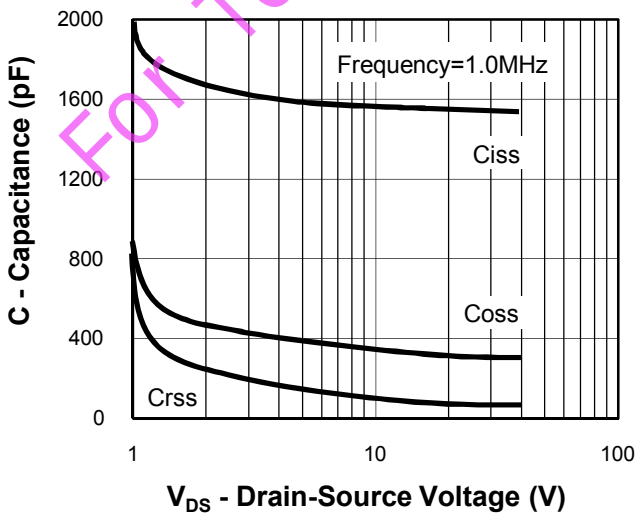
Drain-Source On Resistance



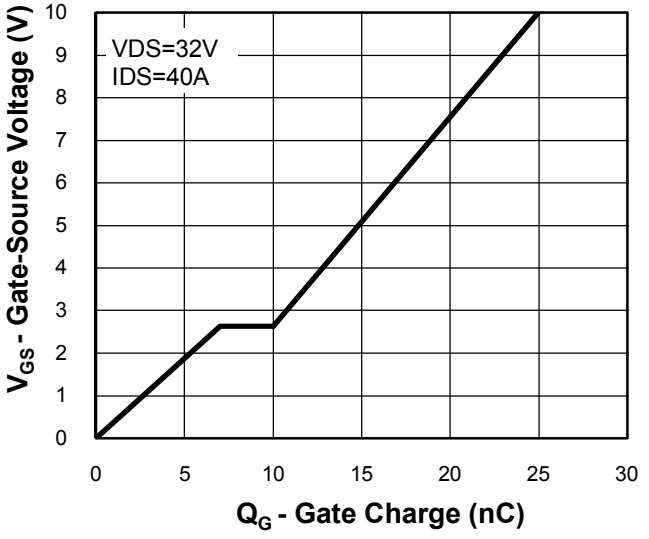
Source-Drain Diode Forward



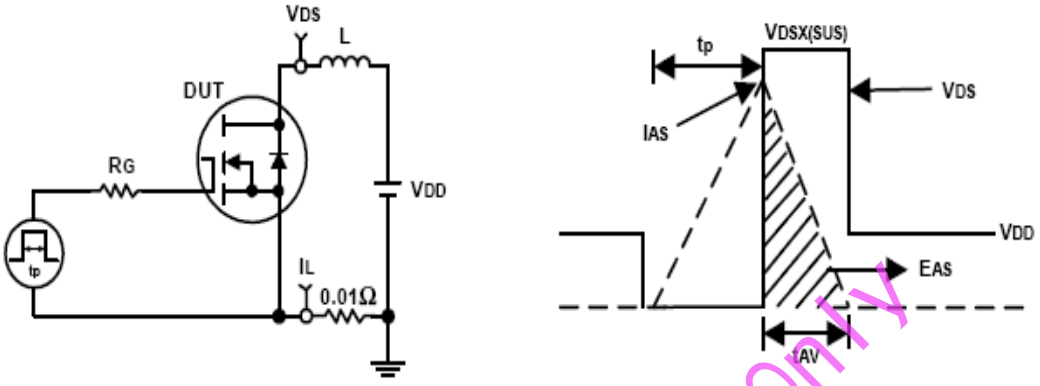
Capacitance



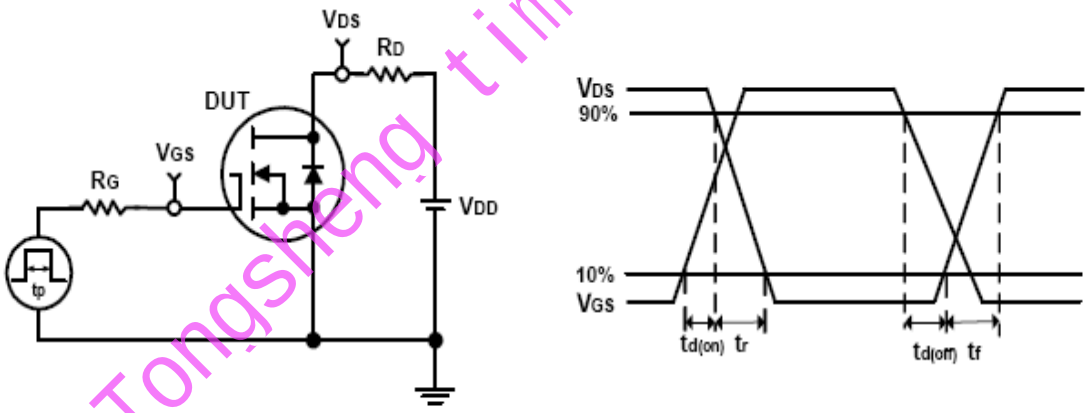
Gate Charge



Avalanche Test Circuit and Waveforms

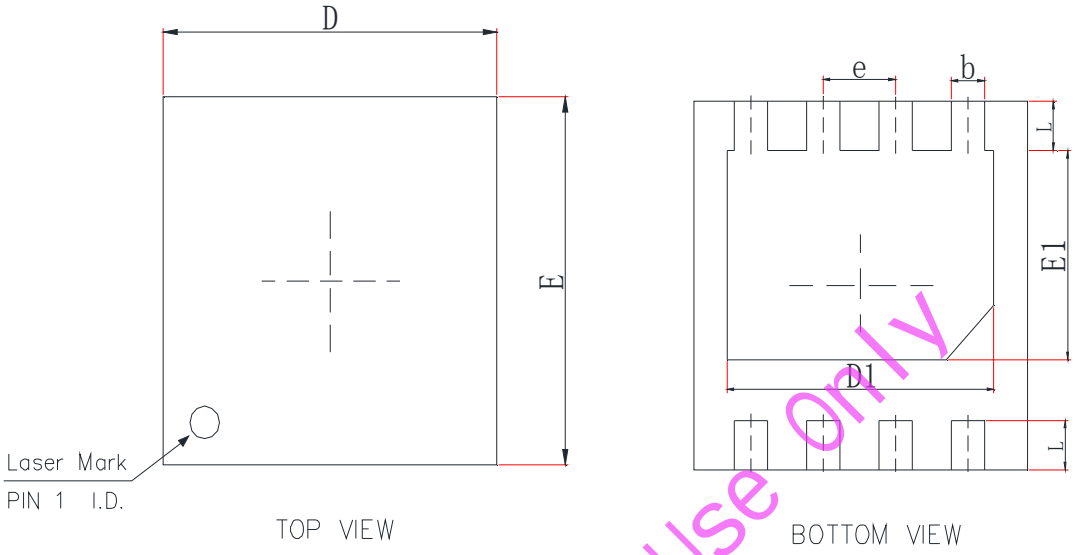


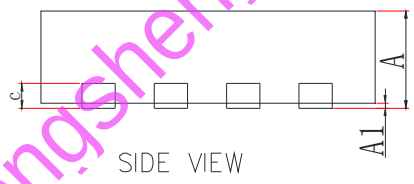
Switching Time Test Circuit and Waveforms



Package Information

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	0.35	0.010	0.012	0.014
c	0.18	0.20	0.30	0.007	0.008	0.012
D	2.95	3.00	3.15	0.116	0.118	0.124
E	2.95	3.00	3.15	0.116	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		