Features

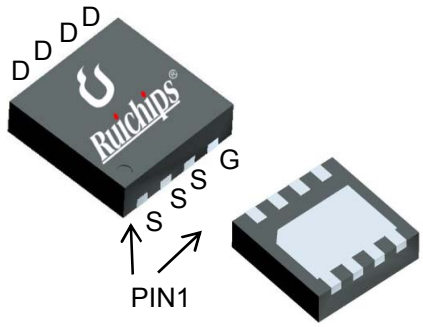
• 40V/190A,
$R_{DS\ (ON)}$ =1.7mΩ(Typ.)@V_{GS}=10V
• Uses Ruichips Proprietary New Trench Technology
• Ultra Low On-Resistance
• Exceptional dv/dt Capability
• Low Gate Charge Minimize Switching Loss
• 100% Avalanche Tested
• Lead Free and Green Devices (RoHS Compliant)

Pb-Free RoHS Halogen-Free

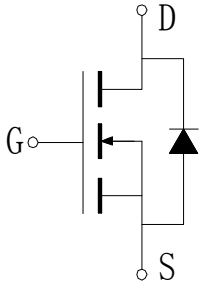
Applications

• DC/DC Converters
• On board power for servers
• Fast charges

Pin Description



DFN5060



N-Channel MOSFET

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		175	°C
T_{STG}	Storage Temperature Range		-55 to 175	°C
I_S	Diode Continuous Forward Current	T_C=25°C	190	A
Mounted on Large Heat Sink				
I_{DP} ①	300μs Pulse Drain Current Tested	T_C=25°C	560	A
I_D ②	Continuous Drain Current@T_C(V_{GS}=10V)	T_C=25°C	190	A
		T_C=100°C	125	
	Continuous Drain Current@T_A(V_{GS}=10V) ③	T_A=25°C	23	
		T_A=70°C	18	
P_D	Maximum Power Dissipation@T_C	T_C=25°C	174	W
		T_C=100°C	70	
	Maximum Power Dissipation@T_A ③	T_A=25°C	2.5	
		T_A=70°C	1.6	

Symbol	Parameter	Rating	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	0.72	°C/W
$R_{\theta JA}$ ③	Thermal Resistance-Junction to Ambient	50	°C/W
Drain-Source Avalanche Ratings			
E_{AS} ④	Avalanche Energy, Single Pulsed	225	mJ

Electrical Characteristics (T_C=25°C Unless Otherwise Noted)

Symbol	Parameter	Test Condition	RUH40190M			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	2		4	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}=10V, I_{DS}=50A		1.7	2.2	mΩ
		T_J=125°C		2.9	3.5	mΩ
Diode Characteristics						
V_{SD} ⑤	Diode Forward Voltage	I_{SD}=50A, V_{GS}=0V		0.9	1.2	V
t_{rr}	Reverse Recovery Time	I_{SD}=50A, dI_{SD}/dt=100A/μs		22.5		ns
Q_{rr}	Reverse Recovery Charge			12		nC
Dynamic Characteristics ⑥						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz		0.8		Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=20V, Frequency=1.0MHz		5050		pF
C_{oss}	Output Capacitance			910		
C_{rss}	Reverse Transfer Capacitance			850		
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=20V,I_{DS}=50A, V_{GEN}=10V,R_G=4.7Ω		27		ns
t_r	Turn-on Rise Time			34		
$t_{d(OFF)}$	Turn-off Delay Time			76		
t_f	Turn-off Fall Time			16		
Gate Charge Characteristics ⑥						
Q_g	Total Gate Charge	V_{DS}=32V, V_{GS}=10V, I_{DS}=50A		135		nC
Q_{gs}	Gate-Source Charge			21		
Q_{gd}	Gate-Drain Charge			31		

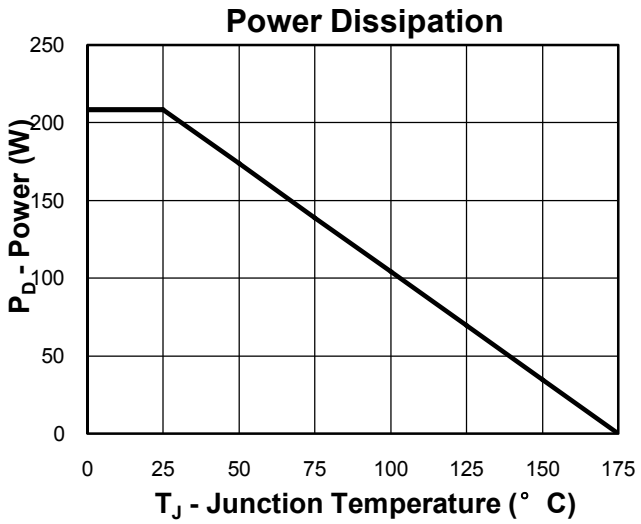
Notes:

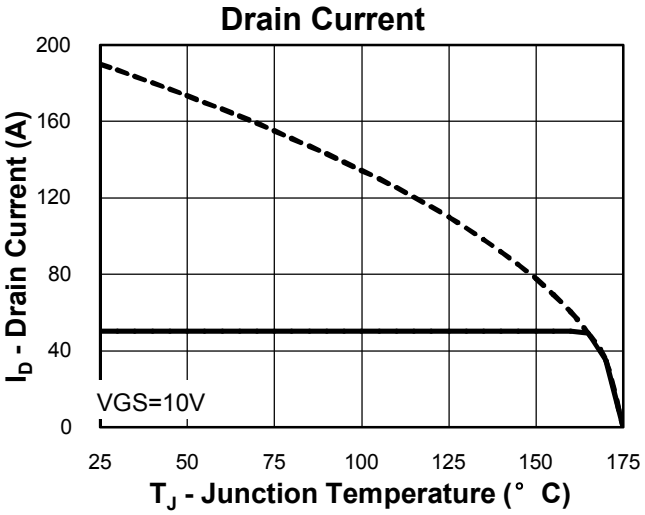
①Pulse width limited by safe operating area.
②Calculated continuous current based on maximum allowable junction temperature. The package limitation current is 50A.
③When mounted on 1 inch square copper board, t≤10sec.
④Limited by TJmax, IAS =30A, VDD = 32V, RG = 50Ω, Starting TJ = 25° C.
⑤Pulse test;Pulse width≤300μs, duty cycle≤2%.
⑥Guaranteed by design, not subject to production testing.

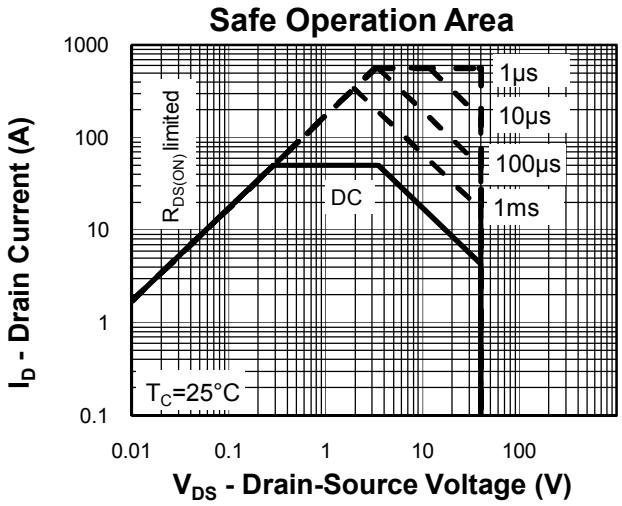
Ordering and Marking Information

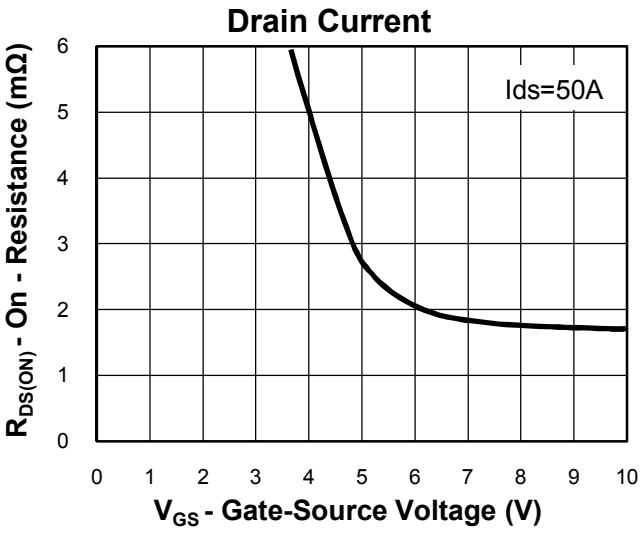
Device	Marking	Package	Packaging	Quantity	Reel Size	Tape width
RUH40190M	RUH40190M	DFN5060	Tape&Reel	5000	13"	12mm

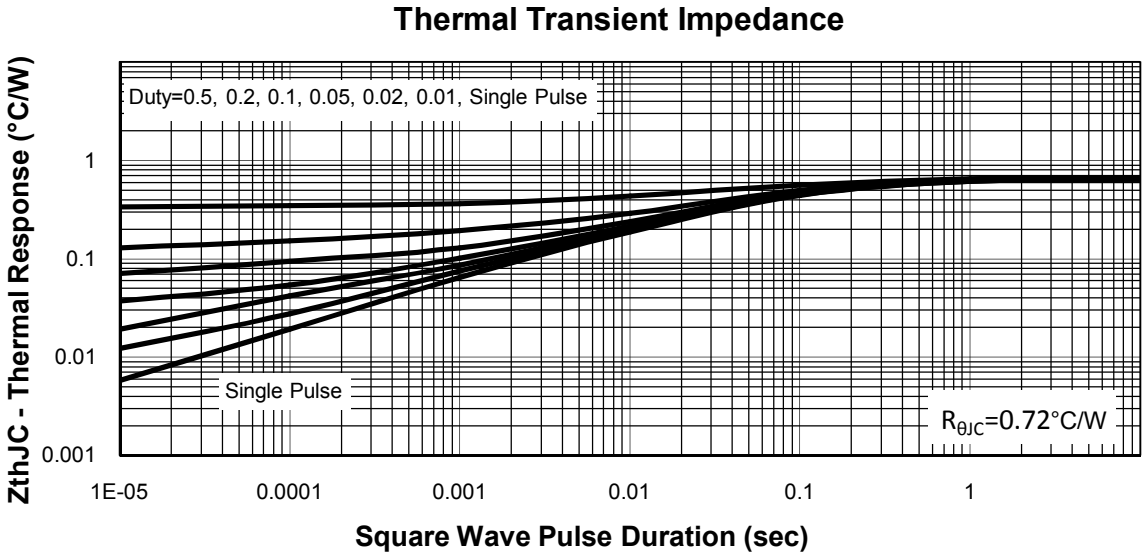
Typical Characteristics





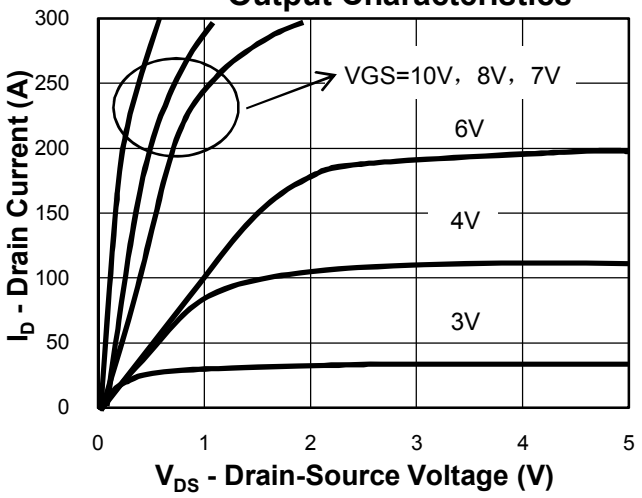




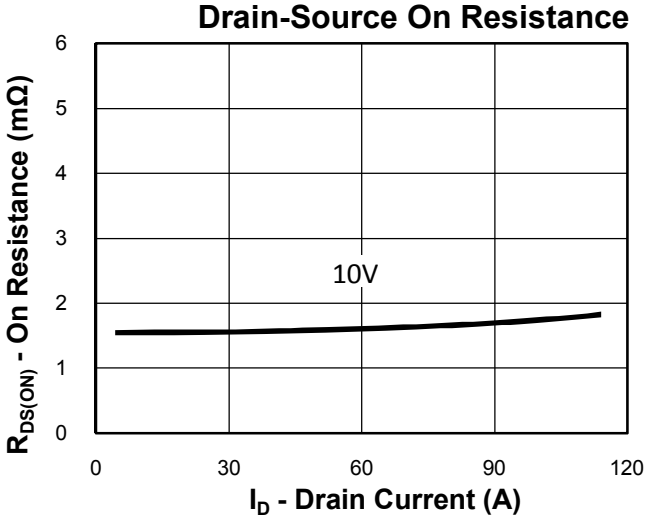


Typical Characteristics

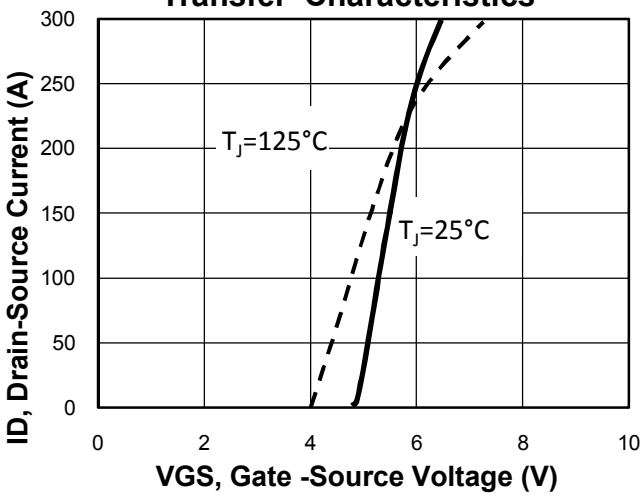
Output Characteristics



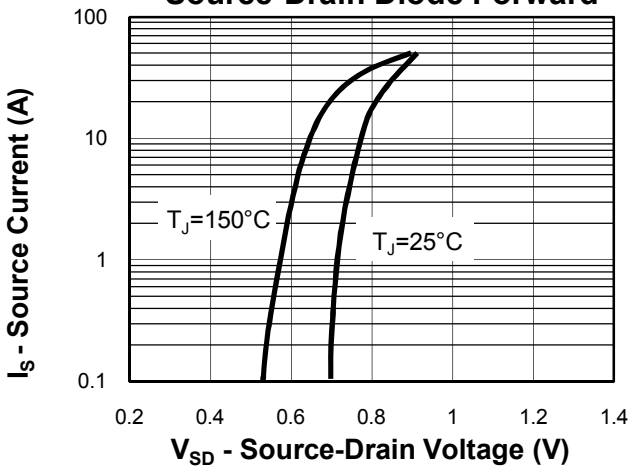
Drain-Source On Resistance



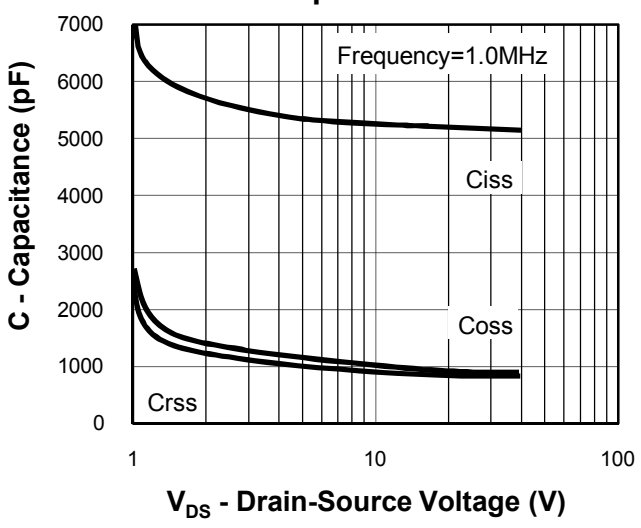
Transfer Characteristics



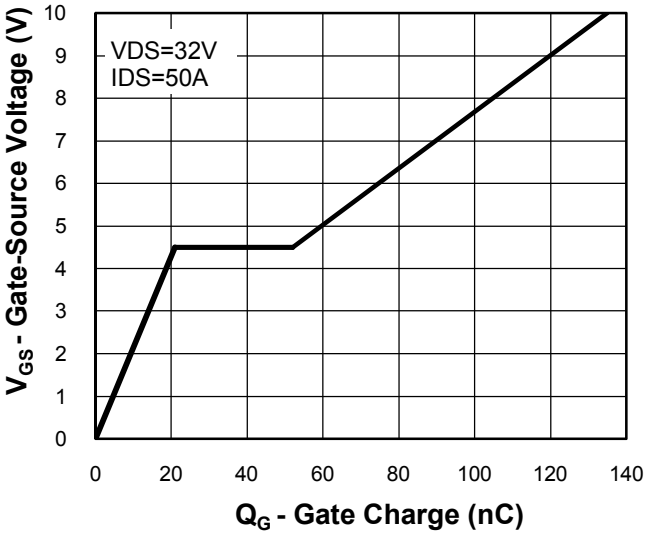
Source-Drain Diode Forward



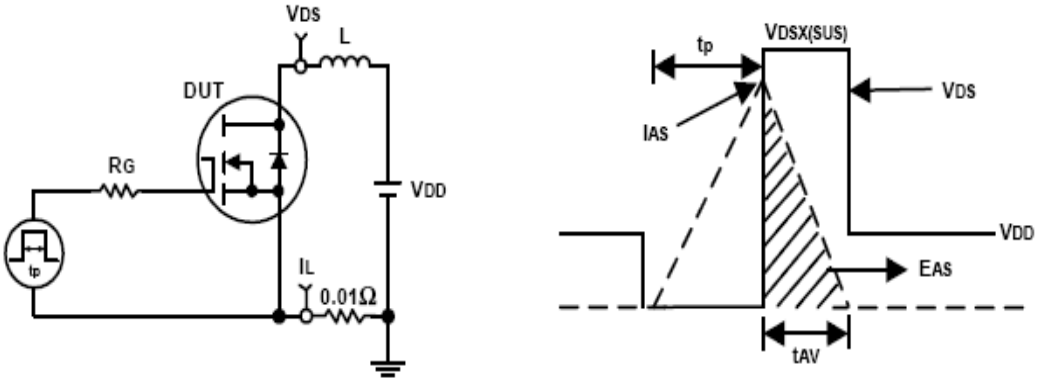
Capacitance



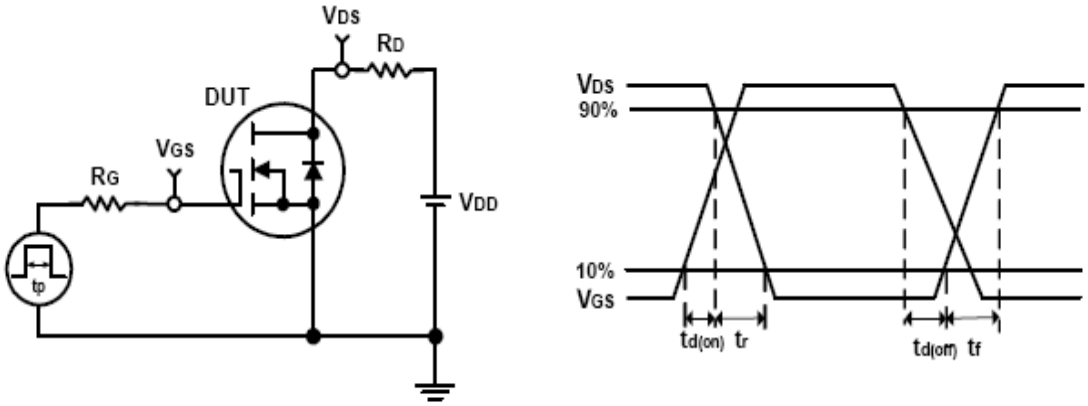
Gate Charge



Avalanche Test Circuit and Waveforms

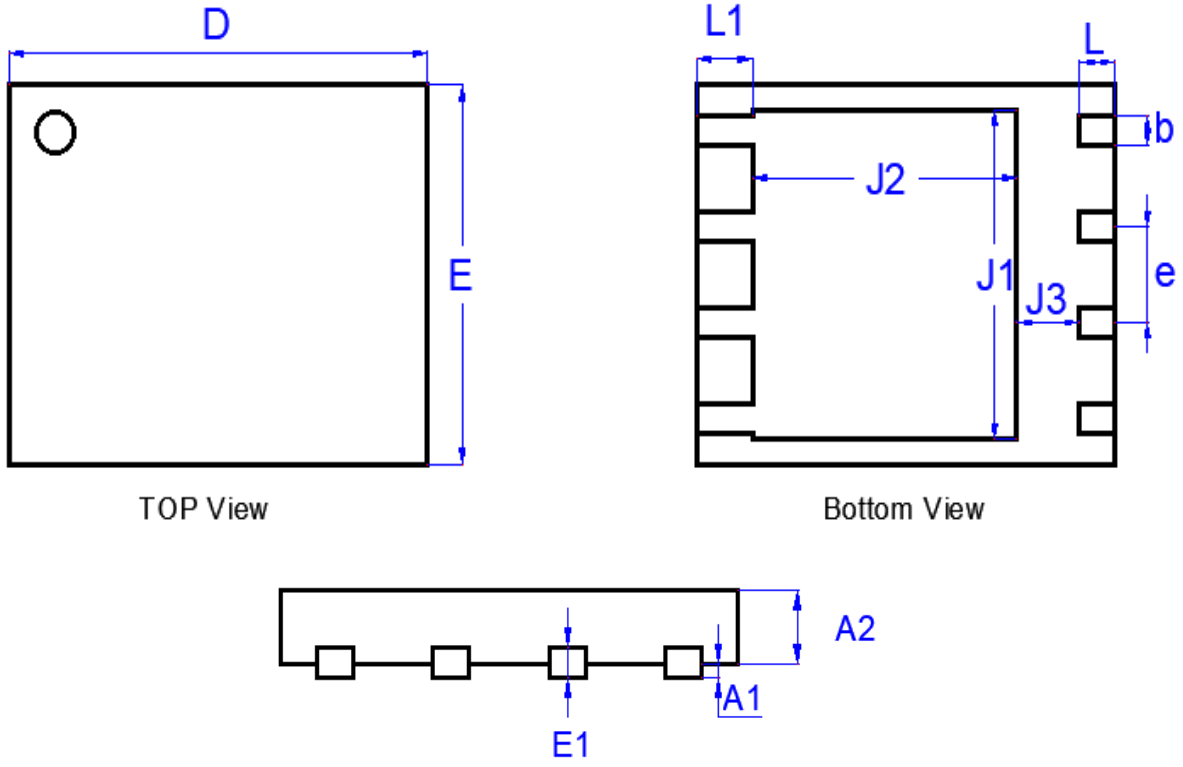


Switching Time Test Circuit and Waveforms



Package Information

DFN5060



NOTE:

1: ALL UNITS ARE IN MILLIMETER.

2: EJECTOR PIN MARK POSITION MAY VARY FROM DIFFERENT MOLD.

3: ALL DIMENSIONS REFER TO JEDEC.DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.

SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A1	–	–	0.15	–	–	0.006
A2	0.70	0.75	0.80	0.028	0.030	0.031
E1	0.185	0.235	0.285	0.007	0.009	0.011
b	0.350	0.400	0.450	0.014	0.016	0.018
e	1.220	1.270	1.320	0.048	0.050	0.052
D	5.900	6.000	6.100	0.232	0.236	0.240
E	4.900	5.000	5.100	0.193	0.197	0.201
J1	4.300	4.360	4.420	0.169	0.172	0.174
J2	3.700	3.800	3.900	0.146	0.150	0.154
J3	0.800	0.900	0.950	0.031	0.035	0.037
L	0.450	0.515	0.565	0.018	0.020	0.022
L1	0.750	0.800	0.850	0.030	0.031	0.033