ZHEJIANG UNIU-NE Technology CO.,LTD

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U2104M Data Sheet

V 1.2

High Current IO+/- 0.4/0.6A HALF-BRIDGE DRIVER

General Description

The U2104M Fully operated to +600V is high voltage, high speed power MOSFET and IGBT driver with dependent high and low side referenced output channels.

The logic input is compatible with standard CMOS or LSTTL output, down to 3.3V logic. The output drivers feature a high pulse current buffer stage designed for minimum driver cross-conduction. The floating channel can be used to drive an N-channel power MOSFET or IGBT in the high side configuration which op-erates up to 600 volts.

Product Summary

V_{OFFSET}	600V max
I_O+/-	0.4A / 0.6A
V_{OUT}	4.8V ~ 20V
$t_{on/off}$ (typ.)	420/220ns
Deadtime (typ.)	220ns
Work Tem	-40 ~150 °C

Key Features

- Integrated bootstrap Diode(1)
- Floating channel designed for bootstrap operation
- Fully operational to +600V
- Tolerant to negative transient voltage dV/dt immune
- Gate drive supply range from 4.8 to 20V
- Undervoltage lockout
- 3.3V, 5V and 15V input logic compatible
- Cross-conduction prevention logic
- internally set deadtime
- High side output in phase with input
- Shut down input turns off both channels
- Matched propagation delay for both channels

Applications

- Home appliances
- Industrial applications and drives
- Motor drivers
- DC- AC Converter, PMDC and PMAC motors
- Induction heating
- HVAC

Pakeages

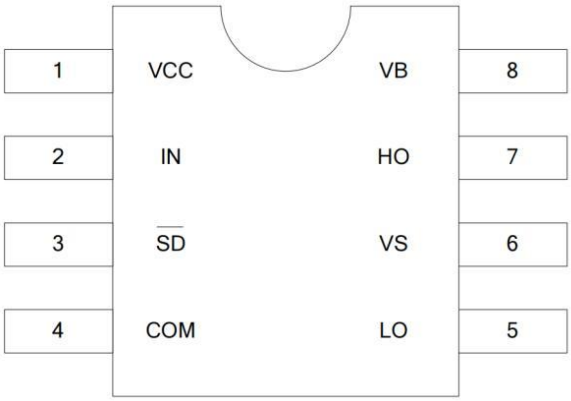
8-Lead SOP

Product information

Base Part Number	Package Type	Standard OUT		VOFFSET	Logic Control
		IO+	IO-		
U2104M	SOP8	0.4A	0.6A	600V	IN & $\overline{SD}$

Note：(1) When using internal diode bootstrap power supply, please match the capacitor and MOS, and fully test and verify

Pin Assignments

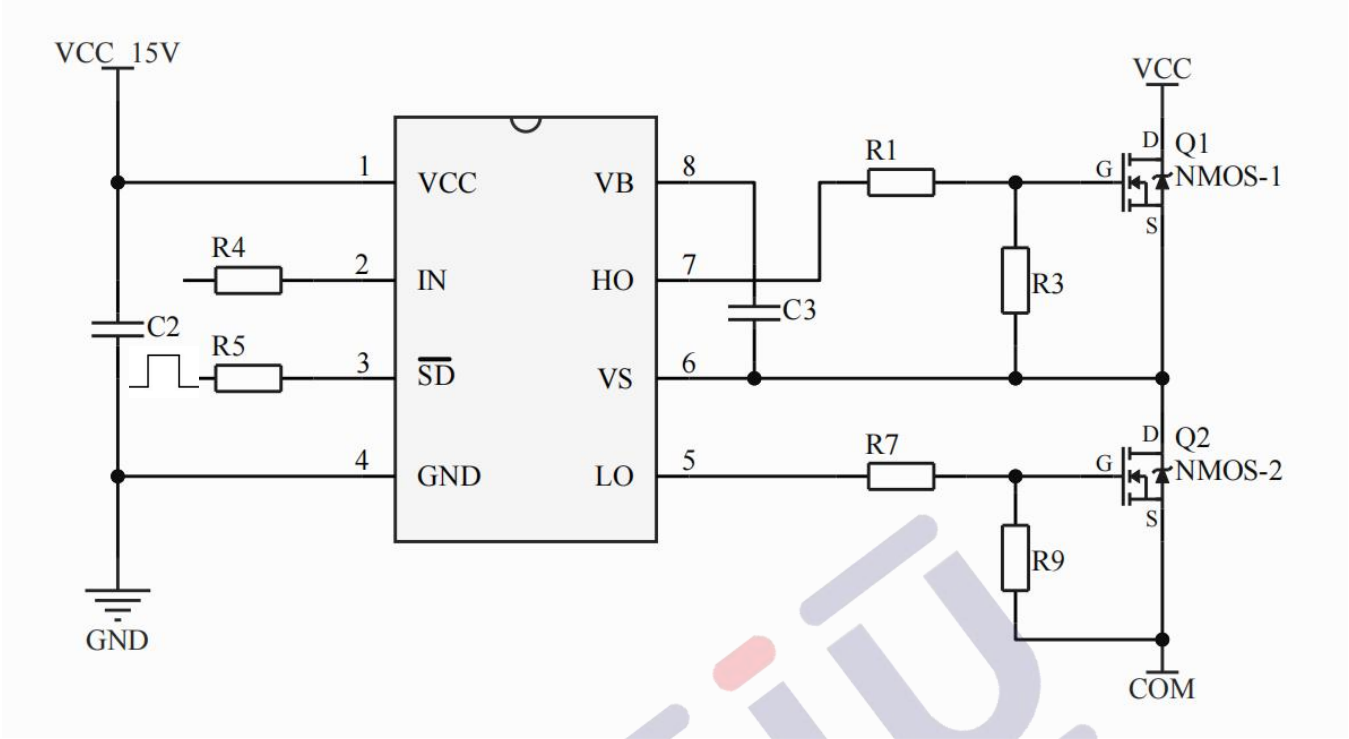


U2104M

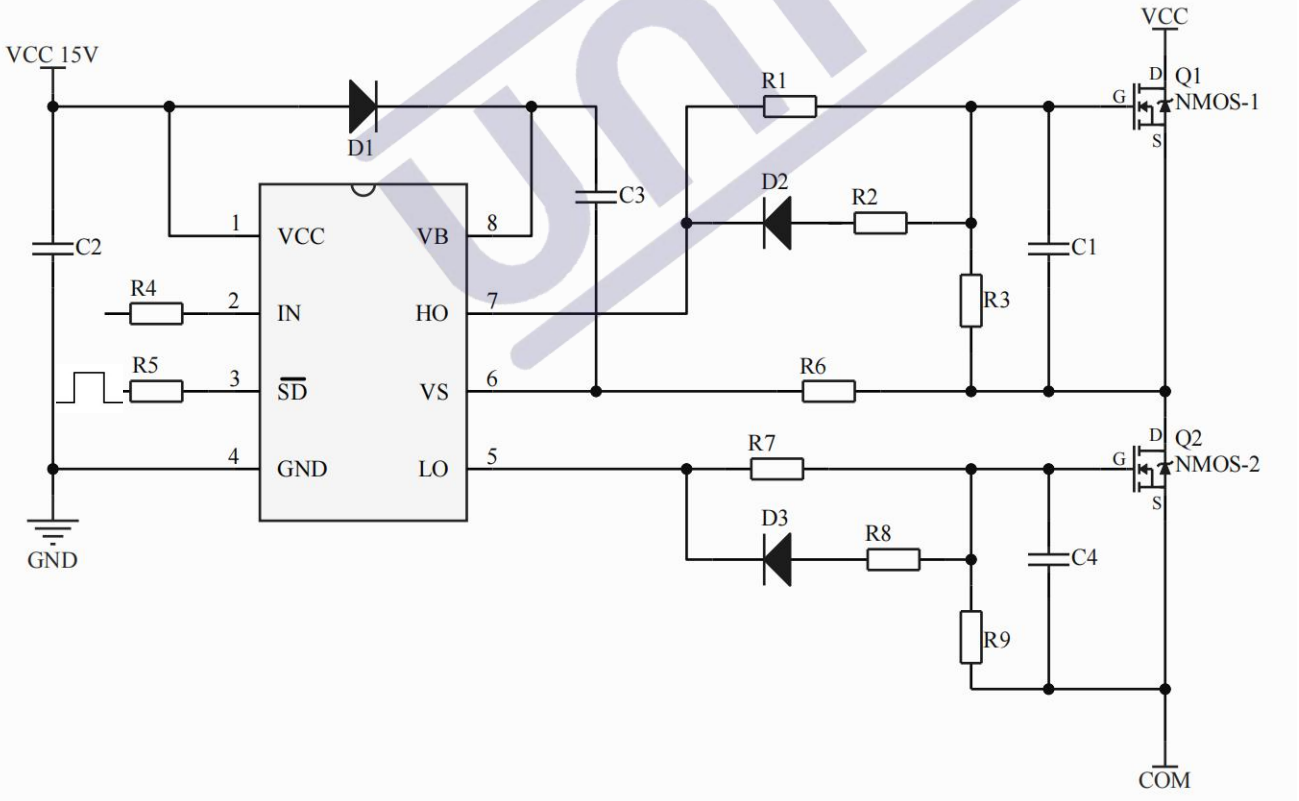
Pin Function

Number	Symbol	Description
1	VCC	Low side and logic fixed supply
2	IN	Logic input for high and low side gate driver outputs (HO and LO)
3	$\overline{SD}$	Logic input for shutdown
4	COM	Low side return
5	LO	Low side gate drive output
6	VS	High side floating supply return
7	HO	High side gate drive output
8	VB	High side floating supply

Typical Connection



Small power application



Typical application

Note: 1.If Q1, Q2 use AP3N50K, it is recommended that R1, R7 resistors choose 200~300R;.
If Q1, Q2 use AP5N50K, it is recommended that R1, R7 resistors choose 100~150R.
2.If other similar MOSFET, you can refer to this parameter.
3.The above circuits and parameters are for reference only. The actual application circuit should be designed with the measured results in setting the parameters.

Absolute Maximum Ratings

Absolute maximum ratings indicate sustained limits beyond which damage to the device may occur. All voltage parameters are absolute voltages referenced to COM. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions.

Symbol	Definition	Min.	Max.	Units
VB	High side floating absolute voltage	-0.3	625	V
VS	High side floating supply offset voltage	VB-25	VB+0.3	
VHO	High side floating output voltage	VS-0.3	VB+0.3	
VLO	Low side output voltage	-0.3	VCC + 0.3	
VCC	Low side and logic fixed supply voltage	-0.3	25	
VIN	Logic input voltage (IN & $\overline{SD}$)	-0.3	Vcc+0.3	
dVS/dt	Allowable offset supply voltage transient	—	55	V/ns
P_D	Package power dissipation @ TA ≤ +25°C	—	0.625	W
Rth_{JA}	Thermal resistance, junction to ambient	—	200	°C/W
TJ	Junction temperature	-35	150	°C
TS	Storage temperature	-55	150	
TL	Lead temperature (soldering, 10 seconds)	—	300	

Recommended Operating Conditions

The Input/Output logic timing diagram is shown in Figure 1. For proper operation the device should be used within the recommended conditions. The VS offset rating is tested with all supplies biased at 15V differential.

Symbol	Definition	Min.	Max.	Units
VB	High side floating supply absolute voltage	VS + 4.8	VS + 20	V
VS	High side floating supply offset voltage	-6(Note1)	600	
VHO	High side floating output voltage	VS	VB	
VLO	Low side output voltage	0	VCC	
VCC	Low side and logic fixed supply voltage	4.8	20	
VIN	Logic input voltage (IN& $\overline{SD}$)	0	VCC	
TA	Ambient temperature	-40	125	°C

Note1:Logic operational for VS of -6 to +600V.Logic state held for VS of -6V to -VBS.

Electrical Characteristic

V_{CC} = V_{BS} = V_{BIAS} = 15V, C_L＝1000pF， T_A = 25°C , unless otherwise specified.

Symbol	Definition	Min.	Typ.	Max.	Units	Test Conditions
tr	Turn-on rise time	—	85	—	ns	
tf	Turn-off fall time	—	40	—		
ton	Turn-on propagation delay	—	420	—		VS = 0V
toff	Turn-off propagation delay	—	200	—		VS =400V
tsd	Shutdown propagation delay	—	160	220		
DT	Deadtime, LS turn-off to HS turn-on & HS turn-on to LS turn-off	—	220	—		
MT	Delay matching, HS & LS turn-on/off	—	—	70		

Electrical Characteristic

V_{CC} = V_{BS} = V_{BIAS} = 15V， T_A = 25°C ， unless otherwise specified.

Symbol	Definition	Min.	Typ.	Max.	Units	Test Conditions
Low Side Power Supply Characteristics						
V_{CCUV+}	VCC supply undervoltage positive going threshold	3.8	4.5	5.2	V	
V_{CCUV-}	VCC supply undervoltage negative going threshold	3.5	4.2	4.9		
V_{CCHYS}	VCC supply under-voltage lockout hysteresis	0	0.3	—		
High Side Floating Power Supply Characteristics						
V_{BSUV+}	VBS supply undervoltage positive going threshold	3.8	4.5	5.2	V	
V_{BSUV-}	VBS supply undervoltage negative going threshold	3.5	4.2	4.9		
V_{BSUVHS}	High side VBS supply under-voltage lockout hysteresis	0	0.3	—		
IQCC	Quiescent VCC supply current	—	20	—	uA	V_{IN} =0V or 5V
IQBS	Quiescent VBS supply current	—	15	—		V_{IN} =0V or 5V
ILK	Offset supply leakage current	—	—	3		VB =VS =400V
VIH	Logic “1” (HO) input voltage	3	—	—	V	VCC =5V to 20V
VIL	Logic “0” (HO) input voltage	—	—	0.8		VCC =5V to 20V
VSD,TH+	SD input positive going threshold	3	—	—		VCC =5V to 20V
VSD,TH-	SD input negative going threshold	—	—	0.8		VCC =5V to 20V
IIN+	Logic “1” input bias current	—	10	—	uA	V_{IN}=5V
IIN-	Logic “0” input bias current	—	—	1		V_{IN}=0V

VOH	High level output voltage, V_{BIAS} - VO	—	—	100	mV	Io = 0A
VOL	Low level output voltage, VO	—	—	100		Io =0A
IO+	Output high short circuit pulsed current	—	400	—	mA	VO= 0V, V_{IN} = V_{IH} PW ≤10 us
IO-	Output low short circuit pulsed current	—	600	—		VO = 15V, V_{IN}= V_{IL} PW ≤10 us

Time waveform

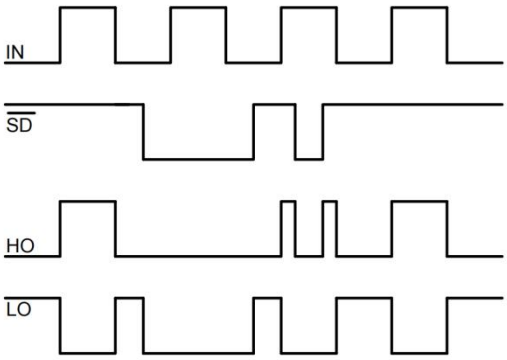


Figure 1. Input/Output Timing Diagram

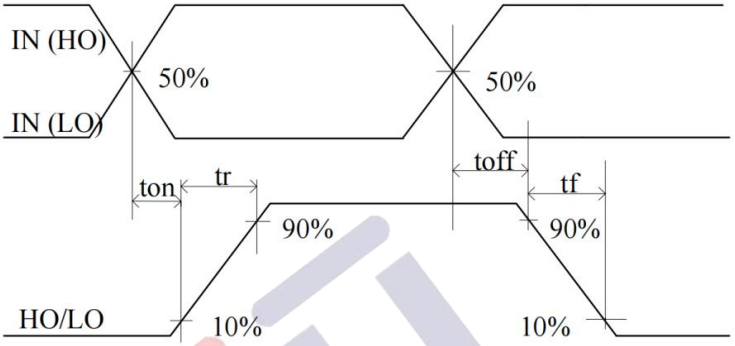


Figure 2. Switching Time Waveform Definitions

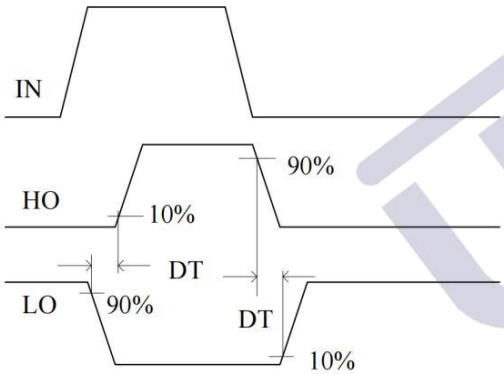


Figure 3.Deadtime Waveform Definitions

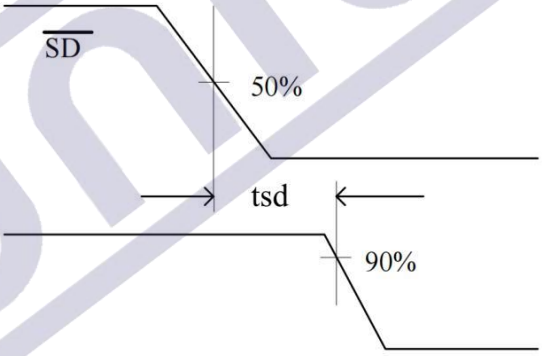


Figure 4.Shutdown Waveform Definitions

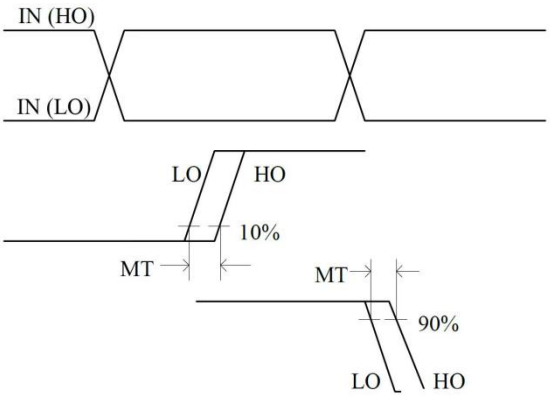
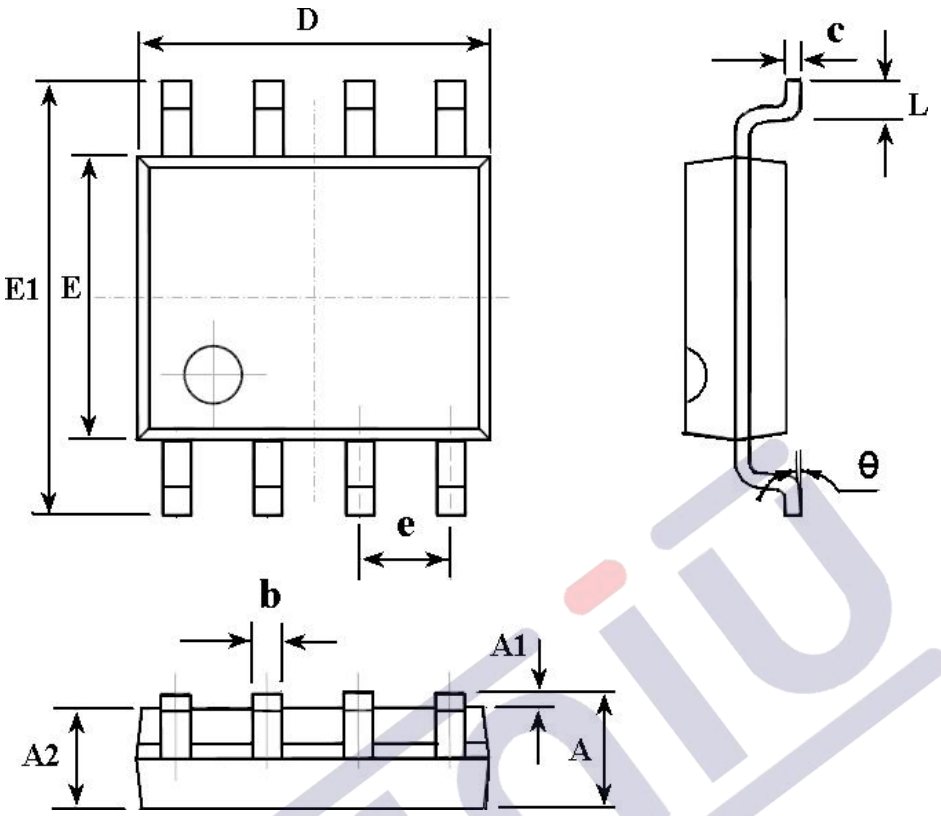


Figure 5.Delay matching time Definitions

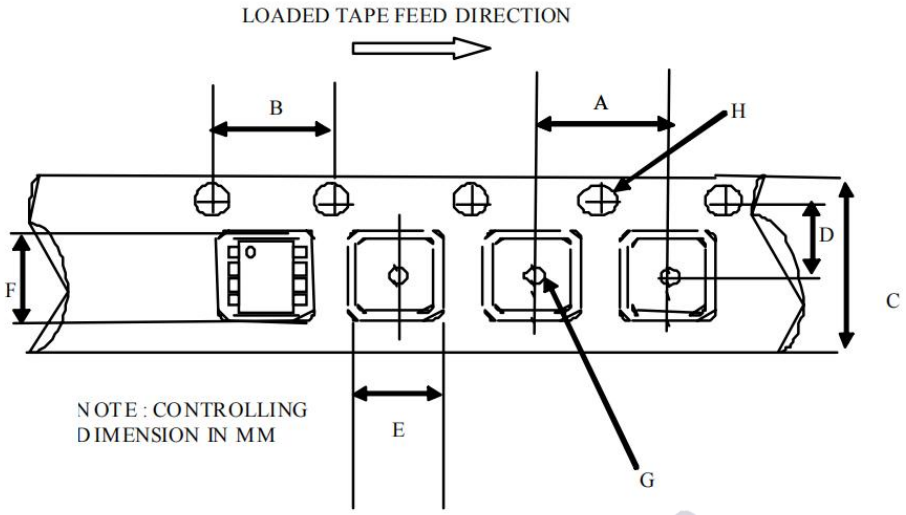
Packaging information

SOP 8



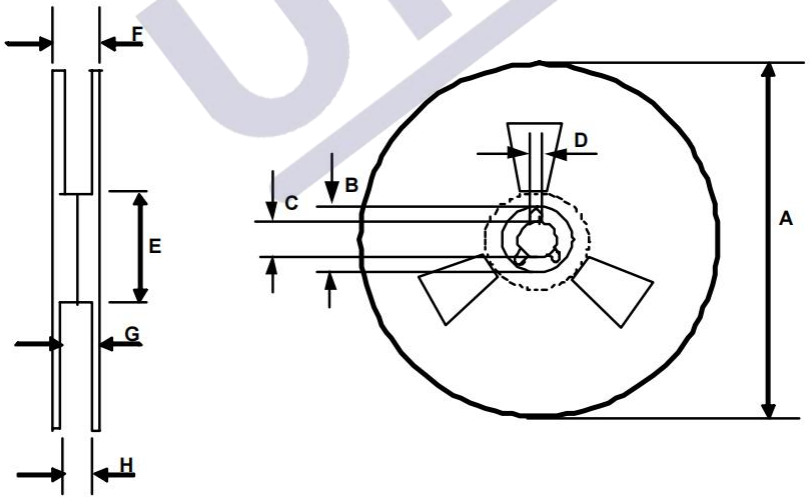
Symbol	Dimensions In Millimeters	
	Min	Max
A	1.350	1.750
A1	0.100	0.250
A2	1.350	1.550
b	0.330	0.510
c	0.170	0.250
D	4.700	5.100
E	3.800	4.000
E1	5.800	6.200
e	1.270(BSC)	
L	0.400	1.270
θ	0°	8°

Tape & Reel 8-lead SOP



CARRIER TAPE DIMENSION FOR 8SOP

Code	Metric		Imperial	
	Min	Max	Min	Max
A	7.90	8.10	0.311	0.318
B	3.90	4.10	0.153	0.161
C	11.70	12.30	0.46	0.484
D	5.45	5.55	0.214	0.218
E	6.30	6.50	0.248	0.255
F	5.10	5.30	0.200	0.208
G	1.50	n/a	0.059	n/a
H	1.50	1.60	0.059	0.062



REEL DIMENSIONS FOR 8SOP

Code	Metric		Imperial	
	Min	Max	Min	Max
A	329.60	330.25	12.976	13.001
B	20.95	21.45	0.824	0.844
C	12.80	13.20	0.503	0.519
D	1.95	2.45	0.767	0.096
E	98.00	102.00	3.858	4.015
F	n/a	18.40	n/a	0.724
G	14.50	17.10	0.570	0.673
H	12.40	14.40	0.488	0.566

1、版本记录

DATE	REV.	DESCRIPTION
2018/04/19	1.0	首次发布
2010/05/21	1.1	变更封装
2023/09/15	1.2	参数调整

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