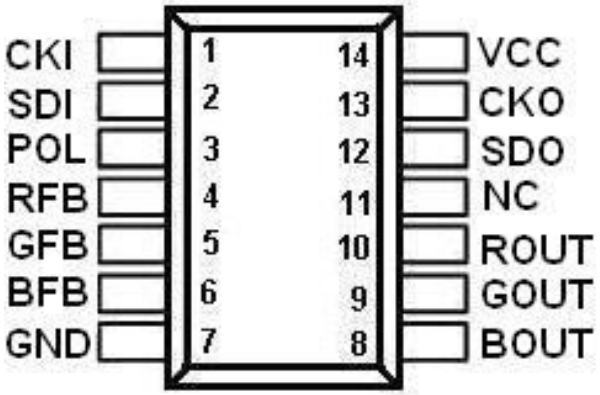
WORLDSEMI CO., LIMITED

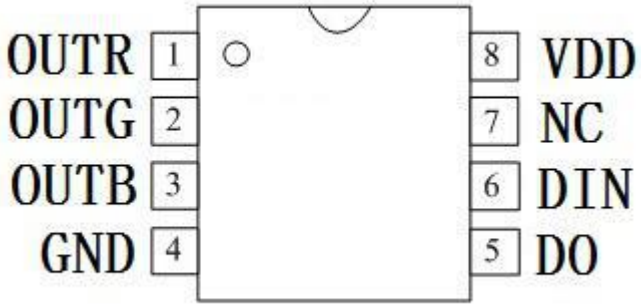
DIGITAL LED WS2812 Series Upgrade Instructions

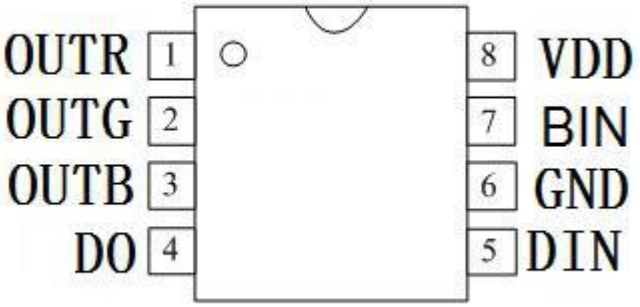
The leading global original manufacturer of DIGITAL LED

Product Overview - LED Driver IC

3-channel dual-line IC WS2801 -SOP14	3-channel dual-line IC WS2811 -SOP8	3-channel dual-line IC WS2818 -SOP8



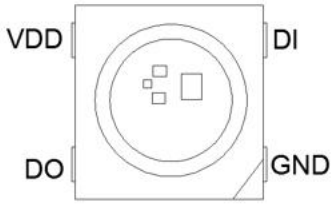




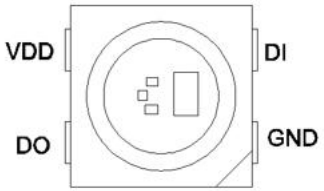
The leading global original manufacturer of DIGITAL LED

Product Overview - Digital addressable LED ~ WS2812 Series

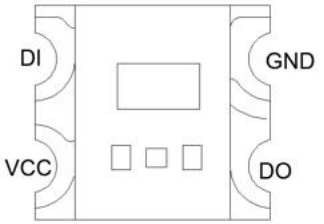
5050 size



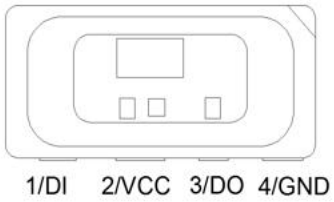
3535 size



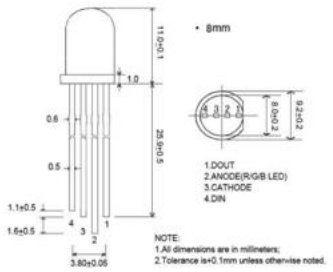
2020 size



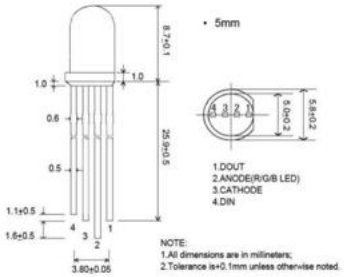
4020 size



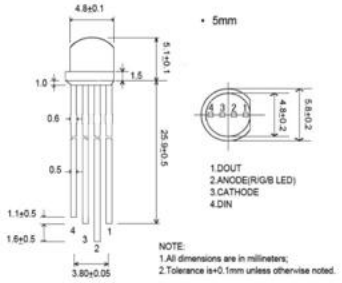
DIP- Φ8 size



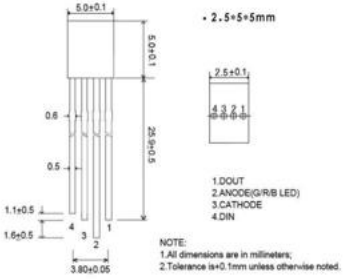
DIP- Φ5 size



DIP- Φ5 Straw-hat size



DIP- F255 size



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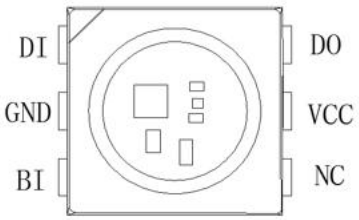
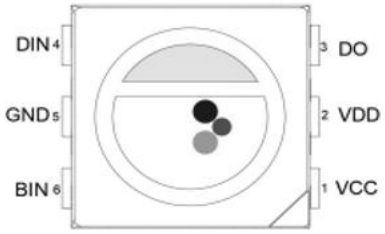
Product Overview - Digital addressable LED ~ WS2813 breakpoint Series

5050 size



5050 RGBW size



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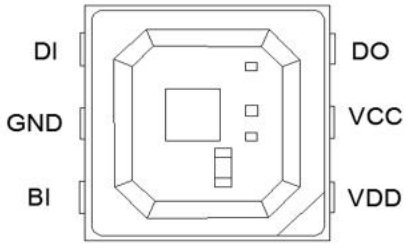
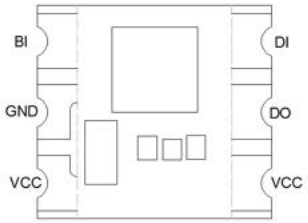
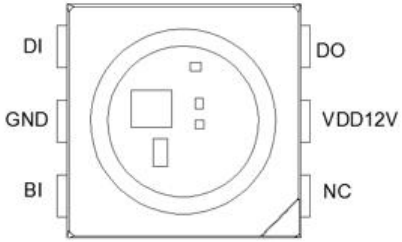


2020 size



Product Overview - Digital addressable LED ~ WS2815 breakpoint SeriesDC12V

5050 size



WS2812 Series Upgrading Key Points

01 IC Internal Integrated Filter Capacitor.
Highly Integrated/NO external components required.

02 Reverse-connection protection
The IC will not be burnt out if VCC and GND reverse conected.

03 VCC/DIN/DOUT PIN instantaneously suppresses 12V voltage.
Increased the PIN withstand voltage

04 Ensure color consistency even under 3.5V working voltage
Driver IC's Low-Dropout performance improved.

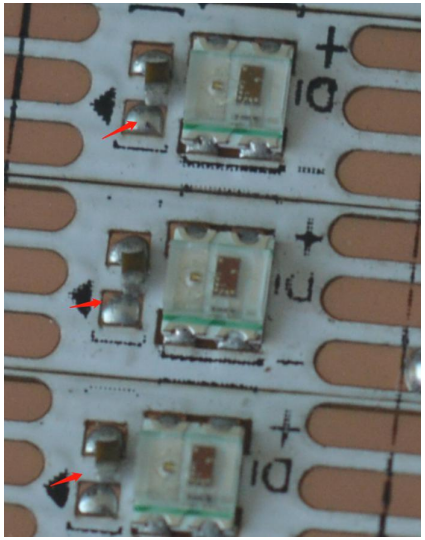
05 Greatly improved the consistency of the LED's color and brightness LED
The accuracy of the IC output current: 5%

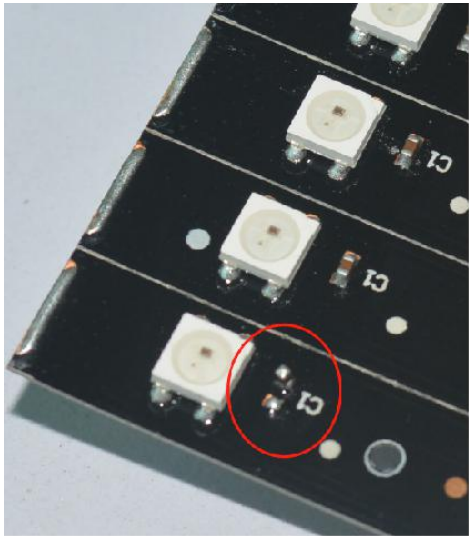
06 Signal recognition range reduced to less than 2.8V
Compatible with 3.3V ARM & 3.0V Bluetooth Chips

07 Improved EMC/EMI performance
Reducing Noise of Power Supply and Output Signal

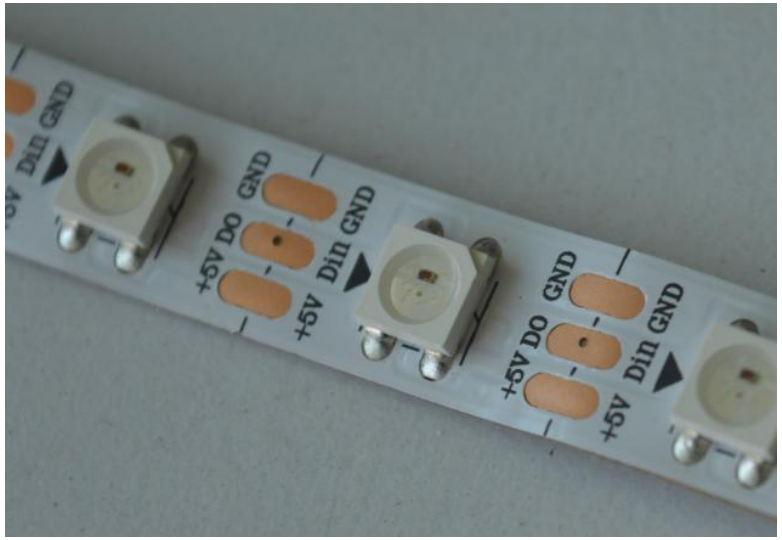
08 All upgraded LEDs' defective rate < 1‰

01 Advantage: NO external components required





VS



Cost Reduction

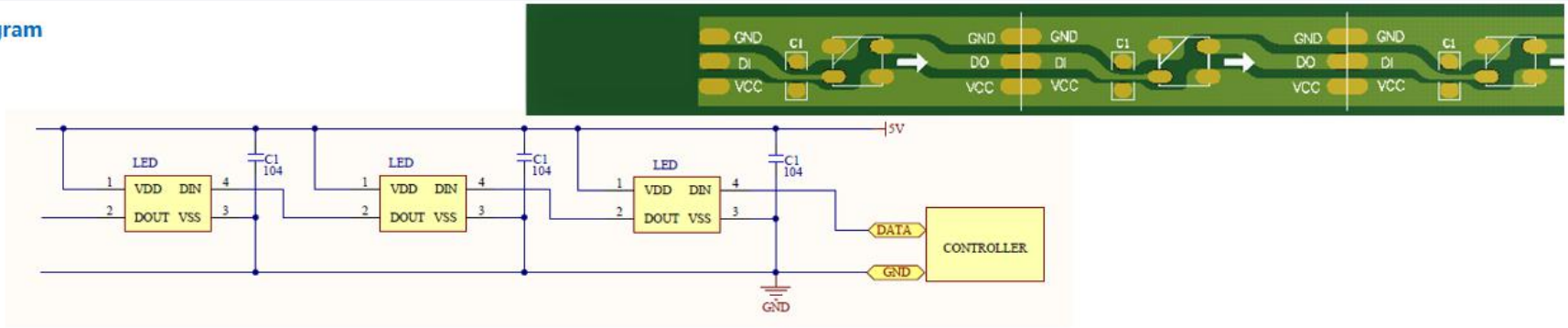
Succient & beatiful appearance

NO faulty welded

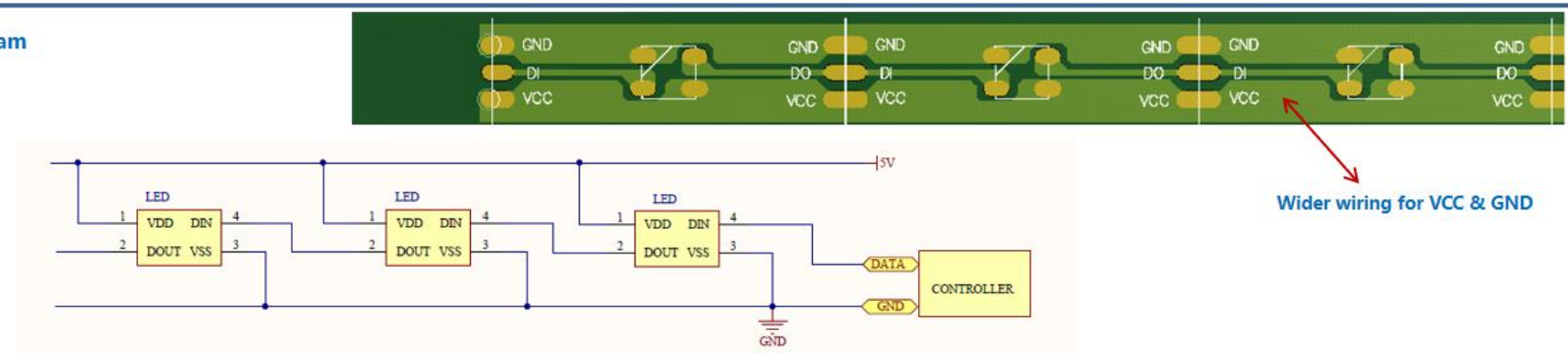
Simplify PCB layout & space-saving

PCB Comparison Diagram

Pre-upgrade Program



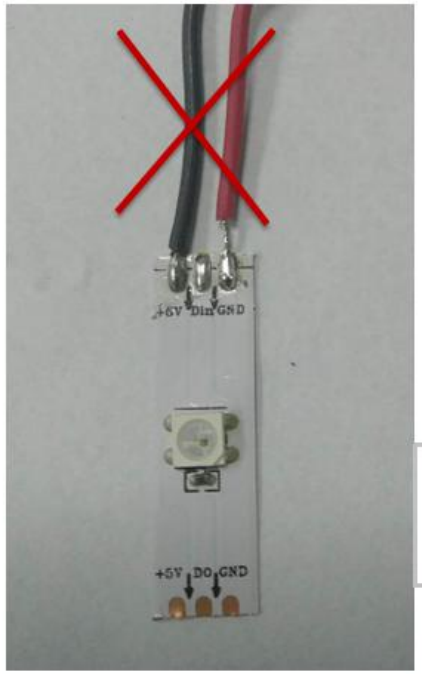
Upgraded Program

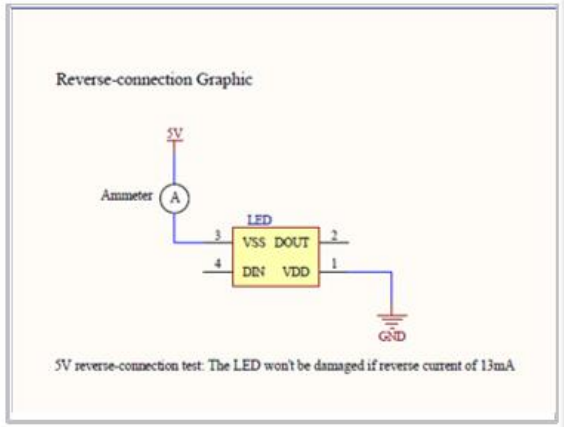


02 Advantage: Reverse-connection Protection

Graphical Representation

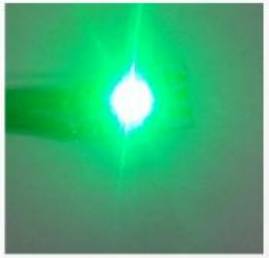
Actual measurement & verification





No protection

LED damaged if reverse- connected

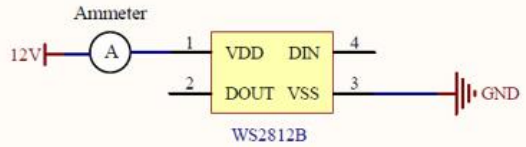


Verification

LED working well

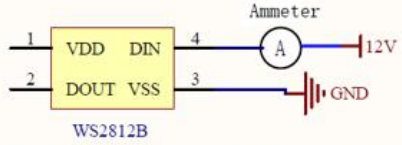
03 Advantage: VCC/DIN/DOUT PIN instantaneously suppresses 12V voltage

VDD connected to high voltage test



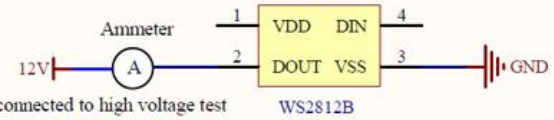
VDD connected to 12V, the static current of IC tested by multimeter is 17 mA, but it won't damage the LED

DIN connected to high voltage test

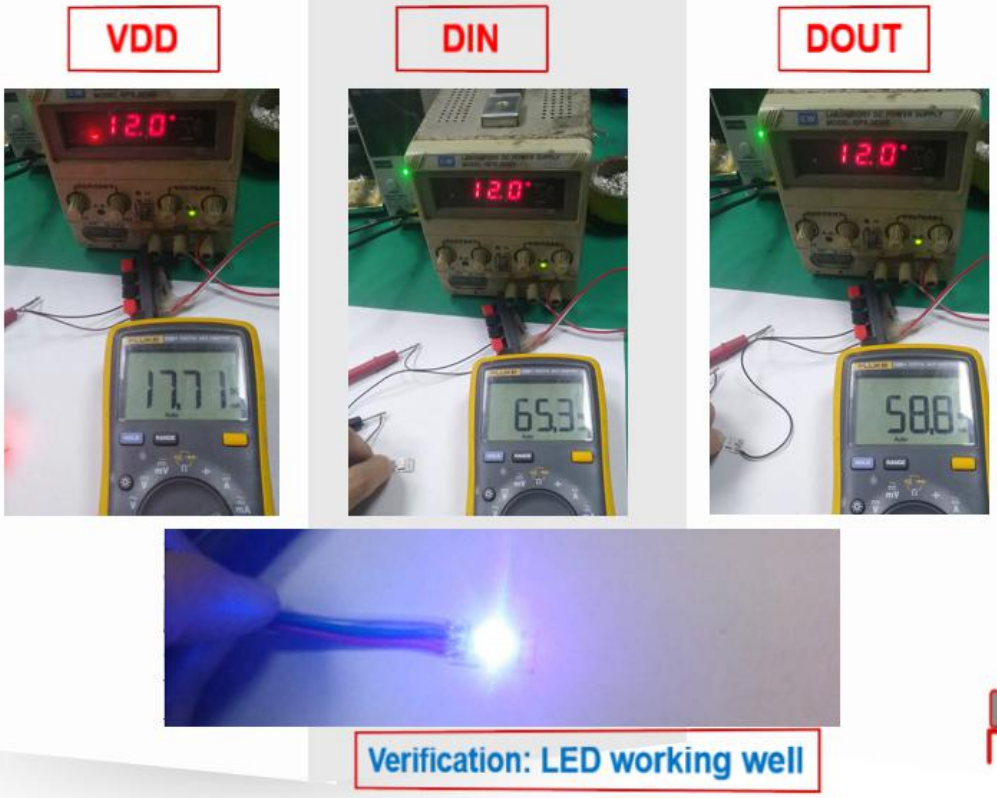


DIN connected to 12V, the static current of IC tested by multimeter is 60 mA, but it won't damage the LED

DO connected to high voltage test



DO connected to 12V, the static current of IC tested by multimeter is 60 mA, but it won't damage the LED

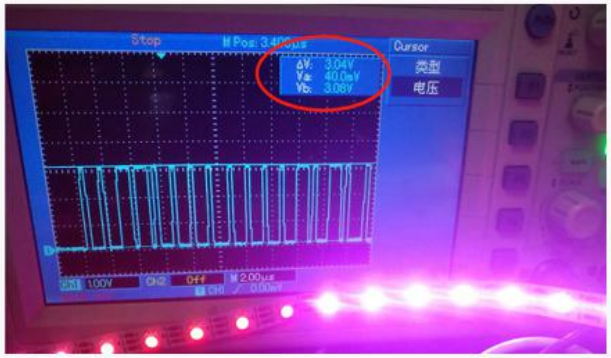


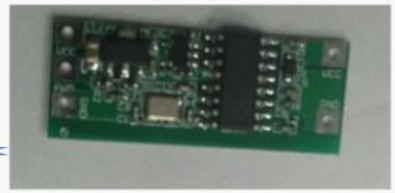
04 Advantage: Compatible with 3.3V ARM; 3.0V Bluetooth chip

NO electrical level conversion circuit required

3.0VBluetooth Controller

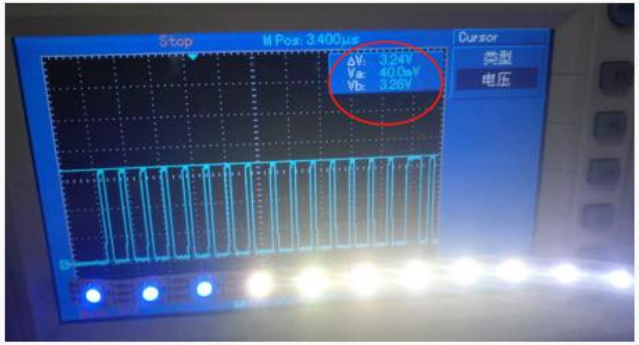
(Actual test and verification)



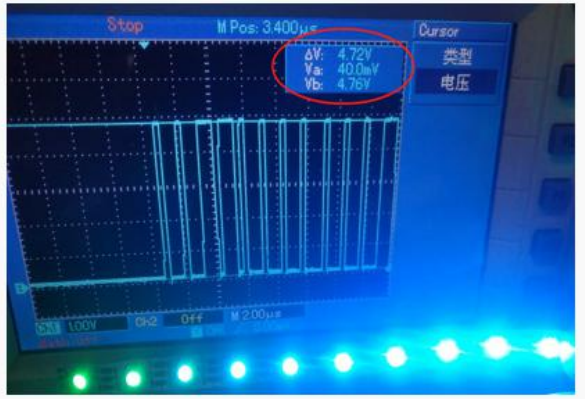


3.3V ARM Controller

(Actual test and verification)



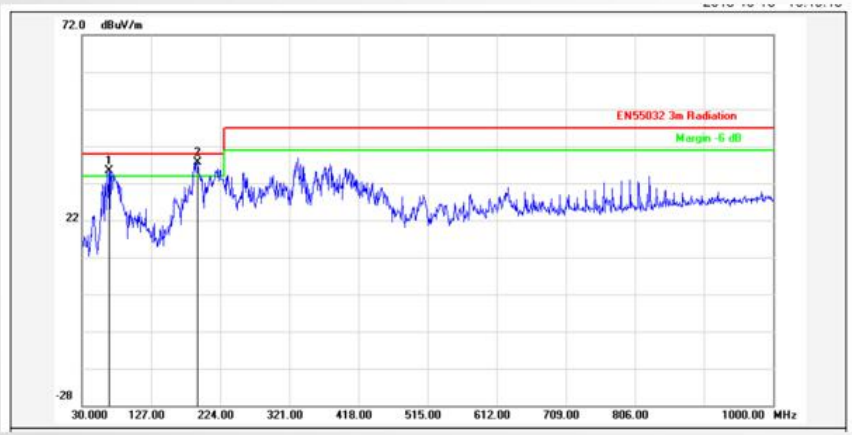
The original ones that only support with 5V needed to raise the signal voltage to support ARM and Bluetooth chips.



Actual test and verification

05 Advantage: EMC/EMI test getting perceptibly better

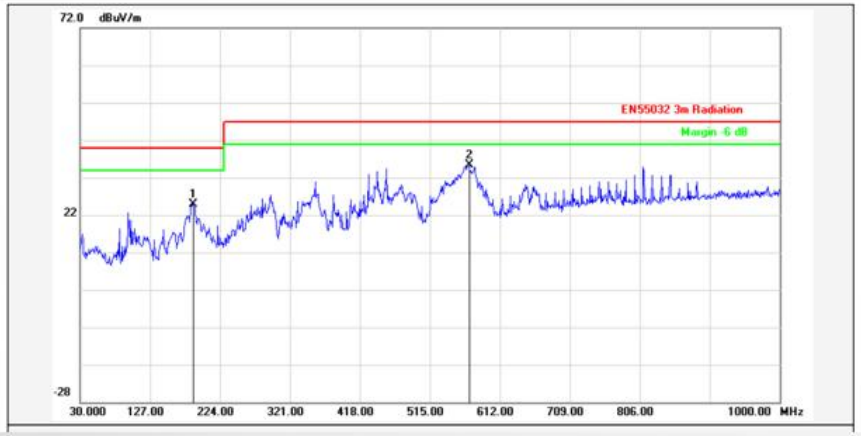
Pre-upgrade: EMC/EMI Spectrum of the over-unit



The highest point slightly exceeds the national standard average, and there is still a certain margin from the highest value.

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	67.8300	11.35	24.01	35.36	40.00	-4.64	peak			P	
2	191.9900	12.83	24.83	37.66	40.00	-2.34	peak			P	

Upgraded: EMC/EMI Spectrum of the over-unit



The highest point has a certain margin from the national standard average, and it reaches the EMC/EMI specifications.

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	187.1400	12.41	12.54	24.95	40.00	-15.05	peak			P	
2	569.3200	22.30	13.12	35.42	47.00	-11.58	peak			P	

Remarks: Two test validation uses the same over-unit machine (a desktop Bluetooth machine with lights), only replacing the LED

06 Advantages: Significant Improvement in Differential Voltage Performance

Light intensity tester

5V-3.5Vpowered, LED keeps constant current, NO visual differential brightness

Actual test & verification

5V White LED Brightness:
2069mcd

Actual test & verification

4V White LED Brightness:
2059mcd

Actual test & verification

3.5V White LED Brightness:
1936mcd

The Upgraded Version Number

WS2812B-V5
WS2812E-V3

5050 Packaging

WS2812B-MINI-V3

3535 Packaging

The following P/N are imported into the upgraded IC without a separate version

※Import into the upgraded IC after all inventory used up※

WS2812B-4020
WS2812C-4020

4020 Packaging

WS2812C-2020

2020 Packaging

WS2812S
WS2812A
WS2812C

5050 Packaging