# Texas Instruments

# PMP4478 Test Procedure

# China Power Reference Design

# REV A

# 03/20/2015

# 1 GENERAL

## 1.1 PURPOSE

To provide detailed data for evaluating and verifying the PMP4478, this uses TI controller-- UCC28740 for 5V3A adapter with size 44mmx35mmx15mm.

## 1.2 REFERENCE DOCUMENTATION

Schematic PMP4478_SCH.PDF
Assembly PMP4478_PCB.PDF
BOM
Gerber files

## 1.3 TEST EQUIPMENTS

Power-meter: YOKOGAWA WT210
Multi-meter(voltage): Fluke 287C
AC Source: Chroma 61530
Electronic load: Chroma 63105A module
Testing demoboard

# 2 INPUT CHARACTERISTICS

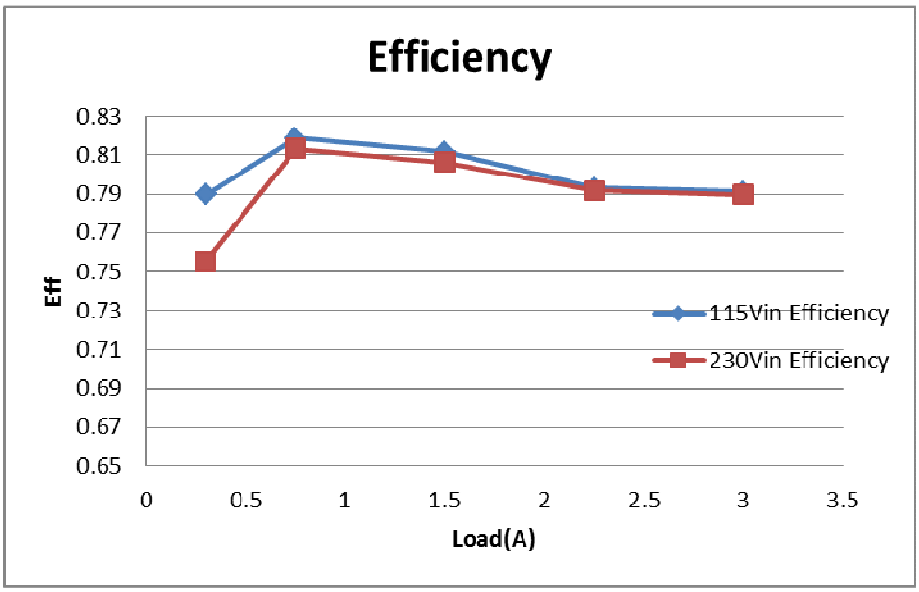
## 2.1 STANDBY POWER

| Vin(Vac) | Pin(mW) |
|---|---|
| 264 | 27 |
| 230 | 22 |
| 180 | 18 |
| 150 | 16 |
| 115 | 16 |
| 90 | 15 |

## 2.2 EFFICIENCY DATA

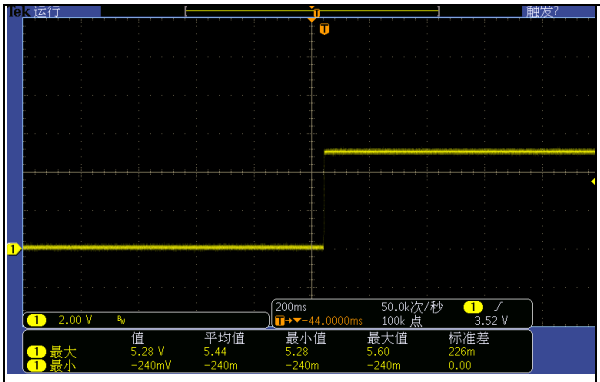
Notes: efficiency test is based on USB port

| Vin | Pin | Vo | Io | Po | Eff |
|---|---|---|---|---|---|
| | 1.99 | 5.01 | 0.3 | 1.503 | 0.7553 |
| | 4.62 | 5.01 | 0.75 | 3.7575 | 0.8133 |
| | 9.32 | 5.01 | 1.5 | 7.515 | 0.8063 |
| | 14.25 | 5.01 | 2.252 | 11.283 | 0.7918 |
| | 19 | 5 | 3 | 15 | 0.7895 |
| 230 | | | | | 0.8002 |
| | 1.91 | 5.01 | 0.301 | 1.508 | 0.7895 |
| | 4.59 | 5.01 | 0.75 | 3.7575 | 0.8186 |
| | 9.26 | 5.01 | 1.5 | 7.515 | 0.8116 |
| | 14.19 | 5 | 2.251 | 11.255 | 0.7932 |
| | 18.96 | 5 | 3 | 15 | 0.7911 |
| 115 | | | | | 0.8036 |

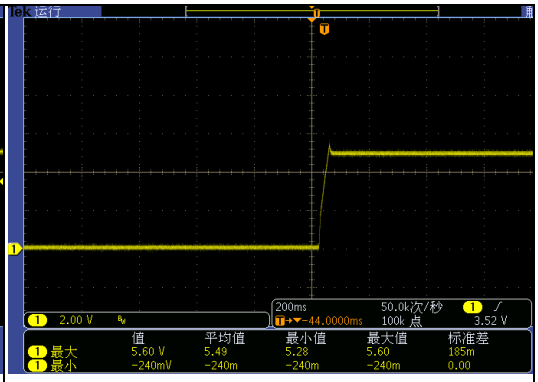


# 3 OUTPUT CHARACTERISTICS

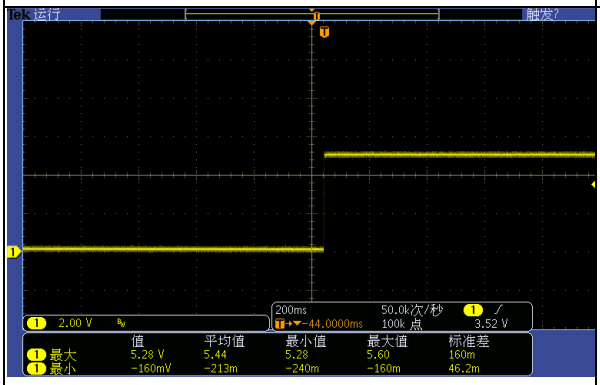
## 3.1 STARTUP



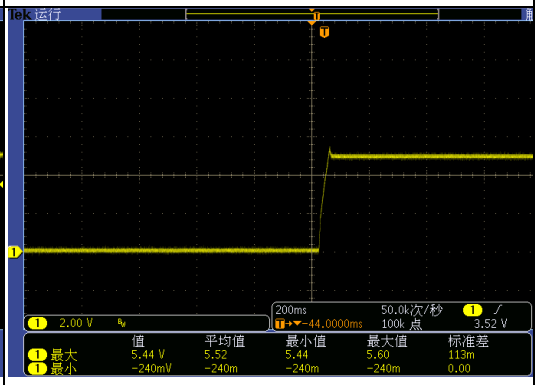

115V 0A Start Up




115V 3A Start Up

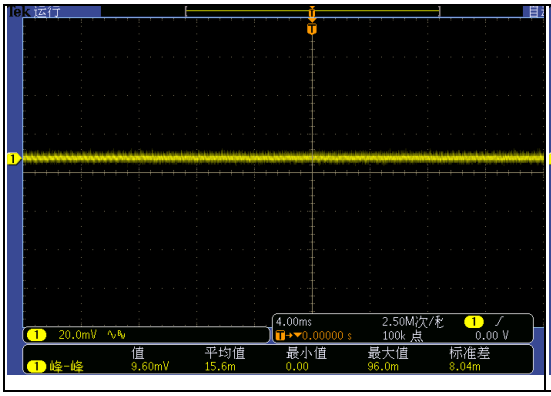


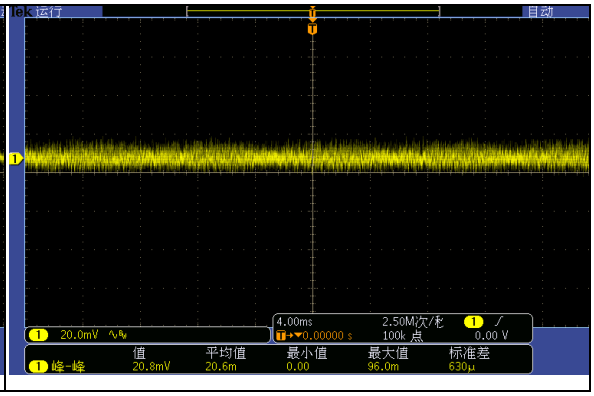

230V 0A Start Up

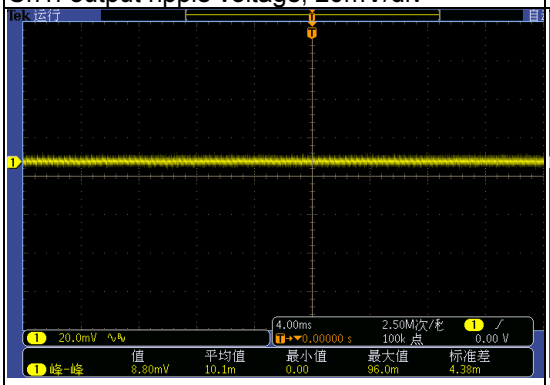
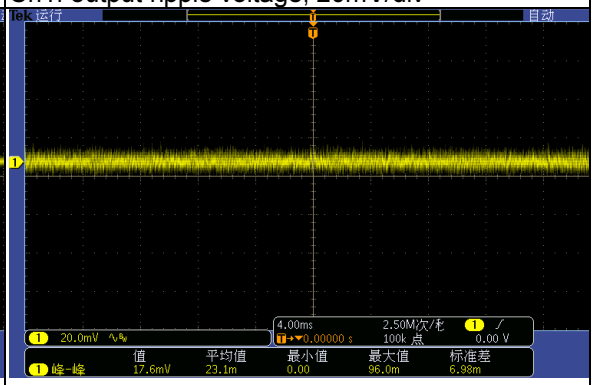
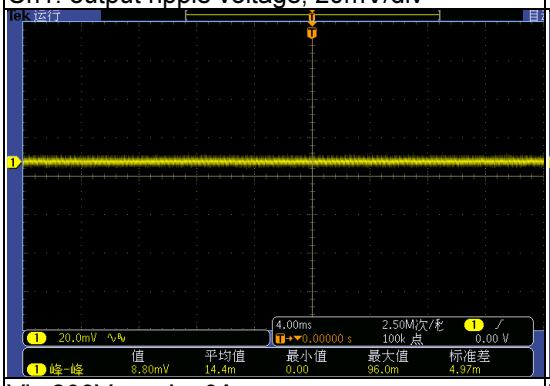
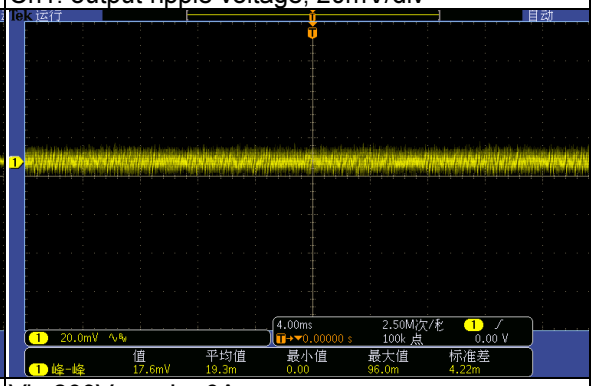
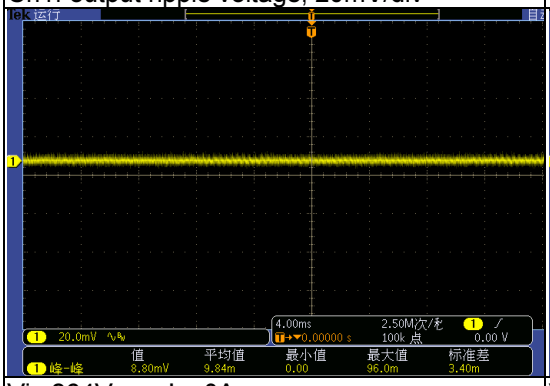
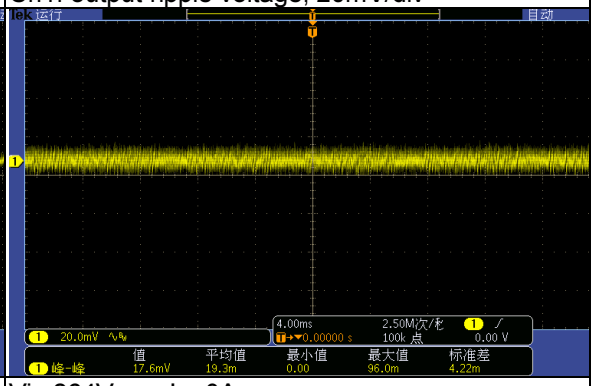



230V 3A Start Up

## 3.2 RIPPLE VOLTAGE

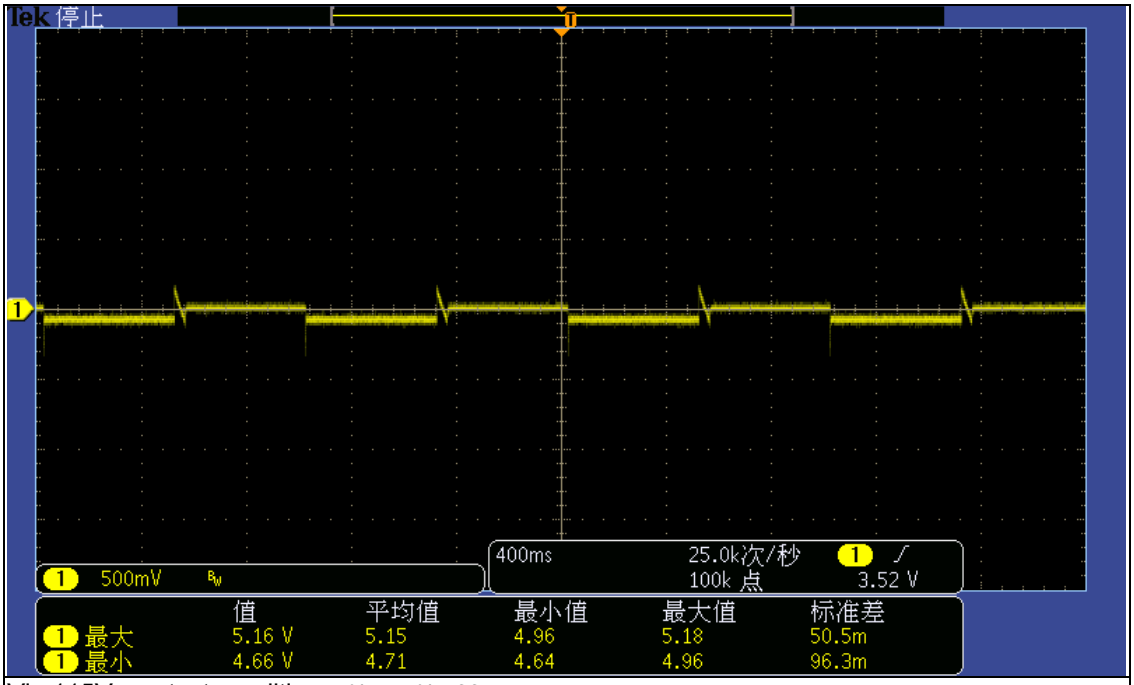


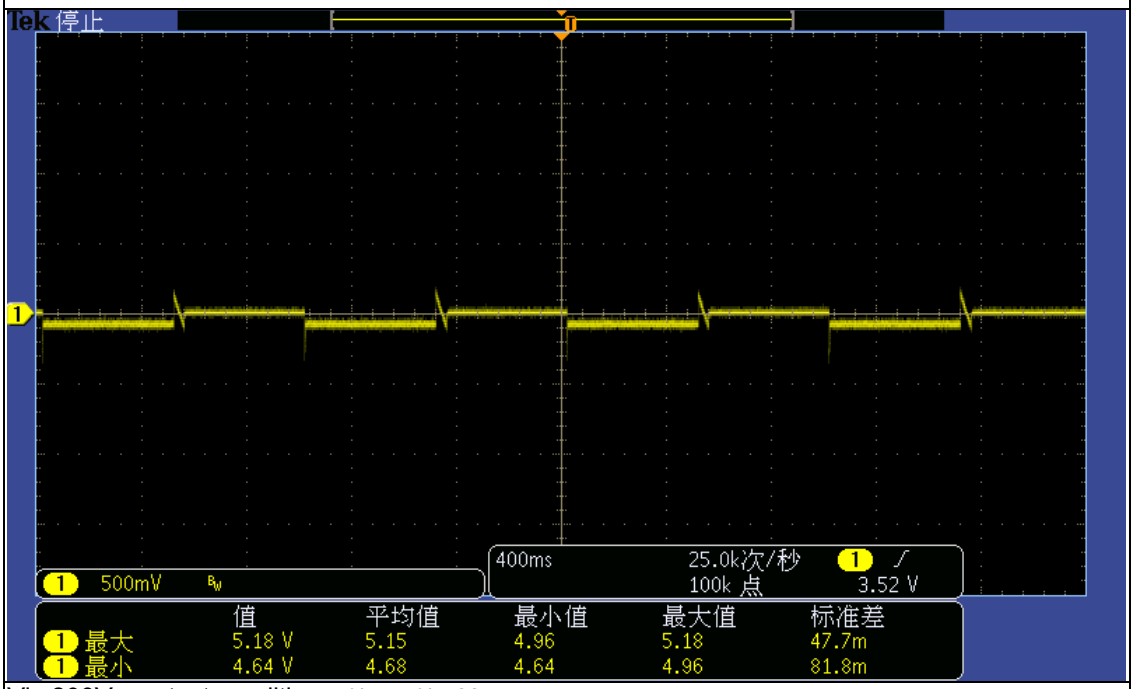
| | |
|---|---|
| Vin:90Vac Io: 0A<br>Ch1: output ripple voltage, 20mV/div | Vin:90Vac Io: 3A<br>Ch1: output ripple voltage, 20mV/div |
|  |  |
| Vin:115Vac Io: 0A<br>Ch1: output ripple voltage, 20mV/div | Vin:115Vac Io: 3A<br>Ch1: output ripple voltage, 20mV/div |
|  |  |
| Vin:230Vac Io: 0A<br>Ch1: output ripple voltage, 20mV/div | Vin:230Vac Io: 3A<br>Ch1: output ripple voltage, 20mV/div |
|  |  |
| Vin:264Vac Io: 0A<br>Ch1: output ripple voltage, 20mV/div | Vin:264Vac Io: 3A<br>Ch1: output ripple voltage, 20mV/div |

## 3.3 DYNAMIC RESPONSE

| Input voltage | Output current | Max voltage | Min voltage |
|---|---|---|---|
| 115Vac | 0%-100% of full load | **5.16V** | **4.66V** |
| 230Vac | 0%-100% of full load | **5.18V** | **4.64V** |



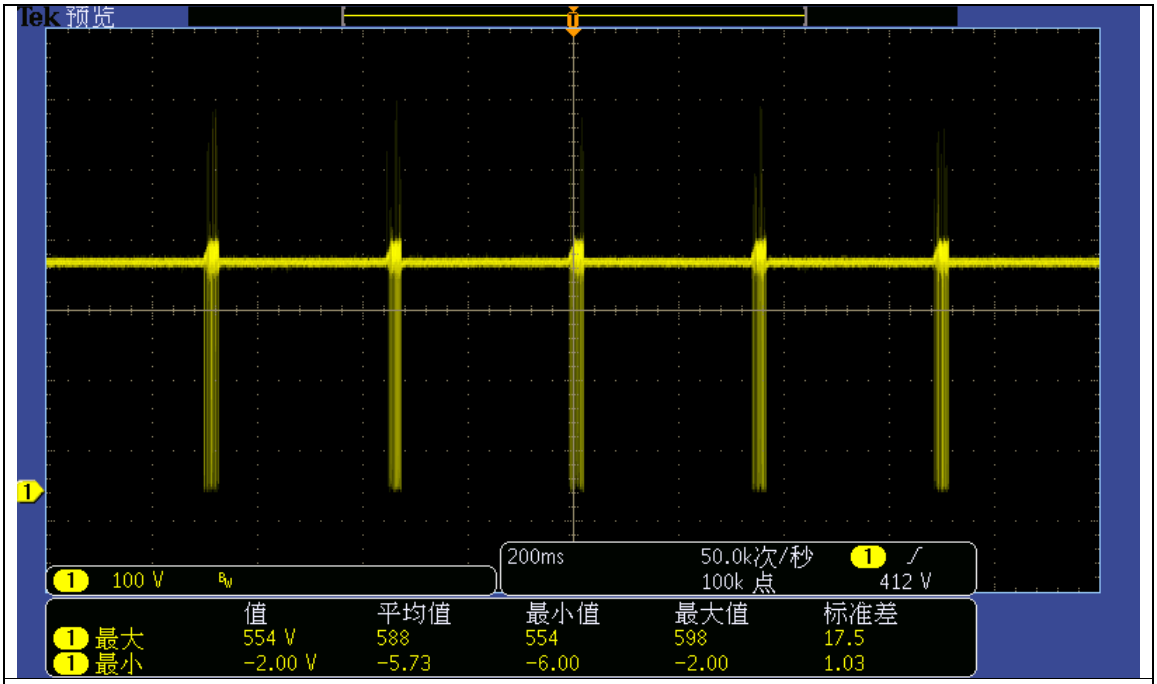

Vin:115Vac test condition: 0%-100% of full load, 0.4A/us, 500ms cycle, 100cm cable
Ch1: output voltage




Vin:230Vac test condition: 0%-100% of full load, 0.4A/us, 500ms cycle, 100cm cable
Ch1: output voltage

## 3.4 OUTPUT SHORT PROTECTION

| Input voltage | Output short protection |
|---|---|
| 115&230Vac | **Hiccup mode** |




Test Condition: 230Vin Over load Protection. CH1:Vds of Mosfet

# 4 EMI Test

## 4.1 Conduction emission

EMI TEST REPORT

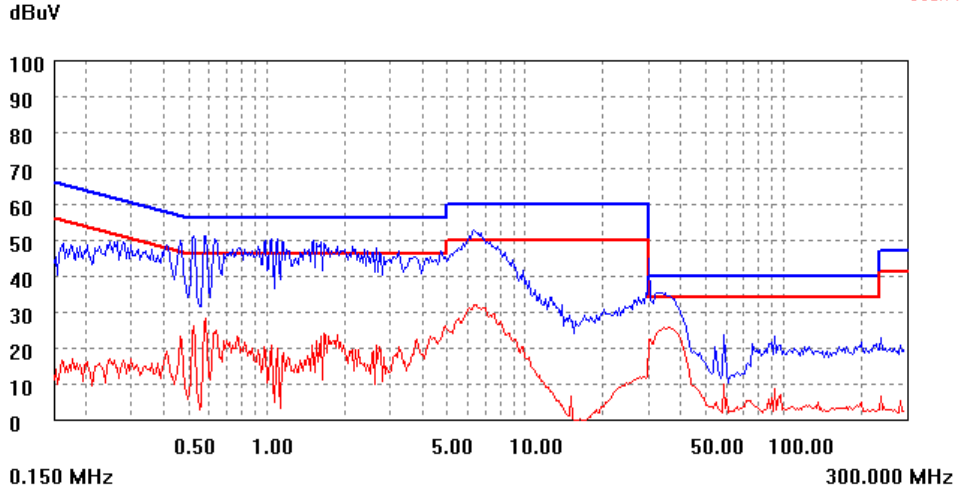
parameter

| | | | | | |
|---|---|---|---|---|---|
| Organization: | | Operator: | | EUT: | |
| Place: | | Time: | 2015/3/20/16:50 | Test equipment: | KH3939 |
| Detector: | PK+AV | Test-time(ms): | 20 | SN: | 1139203 |
| Limit: | EN55022-3-1G | Transductor(PK/AV): | PK1 / AV1 | | |
| Remark: | NOT COOL MOS;1.1MH CM CHOKE;L | | | | |

freq, step

| Start(MHz) | End(MHz) | Step(MHz) |
|---|---|---|
| 0.150 | 2.000 | 0.002 |
| 2.000 | 10.000 | 0.010 |
| 10.000 | 30.000 | 0.025 |
| 30.000 | 100.000 | 0.075 |
| 100.000 | 300.000 | 0.150 |

scan result




final test

| [QP] | freq(MHz) | lev(dBuV) | Lim(dBuV) | Δ(lev-Lim) |
|---|---|---|---|---|
| | 0.524 | 48.0 | 56.0 | -8.0 |
| | 0.580 | 47.8 | 56.0 | -8.2 |
| | 0.632 | 46.2 | 56.0 | -9.8 |
| | 1.040 | 47.1 | 56.0 | -8.9 |

Vin: 230Vac, Line, Io: 3A Test condition: 1.5m cable with 1.67R load resistor

# EMI TEST REPORT

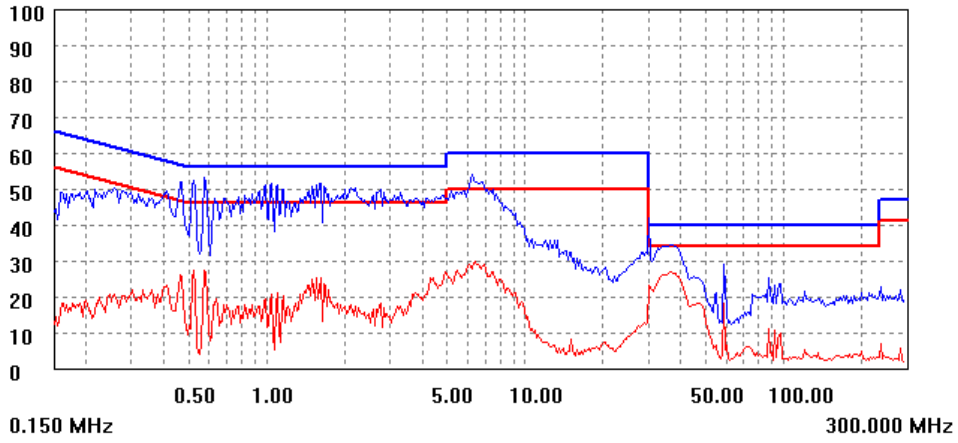
parameter

| | | | | | |
|---|---|---|---|---|---|
| Organization: | | Operator: | | EUT: | |
| Place: | | Time: | 2015/3/20/16:54 | Test equipment: | KH3939 |
| Detector: | PK+AV | Test-time(ms): | 20 | SN: | 1139203 |
| Limit: | EN55022-3-1G | Transductor(PK/AV): | PK1 / AV1 | | |
| Remark: | NOT COOL MOS;1.1MH CM CHOKE;N | | | | |

freq, step

| Start(MHz) | End(MHz) | Step(MHz) |
|---|---|---|
| 0.150 | 2.000 | 0.002 |
| 2.000 | 10.000 | 0.010 |
| 10.000 | 30.000 | 0.025 |
| 30.000 | 100.000 | 0.075 |
| 100.000 | 300.000 | 0.150 |

scan result




final test

| (QP) | freq(MHz) | lev(dBuV) | Lim(dBuV) | Δ(lev-Lim) |
|---|---|---|---|---|
| | 0.576 | 50.5 | 56.0 | -5.5 |
| | 0.522 | 49.5 | 56.0 | -6.5 |
| | 0.988 | 47.7 | 56.0 | -8.3 |

Vin:230Vac, Neutral, Io: 3A Test condition: 1.5m cable with 1.67R load resistor

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