

Integrated 1-3S Standalone Battery Charger with EMI Compliance **PMP4397**

1 General

1.1 PURPOSE

Provide the detailed data for evaluating and verifying the PMP4397 radiated emission performance.

PMP4397 is DC input (4.5V – 15V) and 2-cell battery charger module.

The cell number could be trimmed by the resistors; the range is from 1-cell to 3-cell.

Typical application is the 2-cell (8.4V/2000mAH).

1.2 REFERENCE DOCUMENTATION

PMP4397 Schematics.pdf

PMP4397 PCB Layout.pdf

PMP4397 BOM.pdf

1.3 TEST EQUIPMENTS

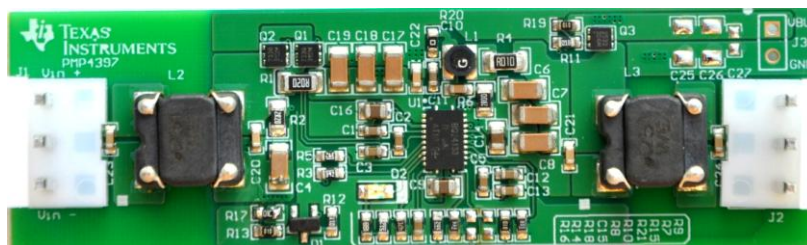
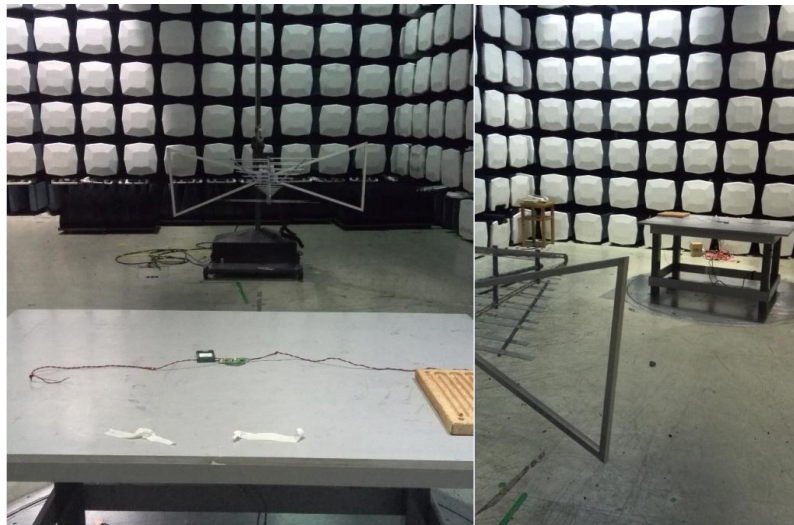
Multi-meter: Fluke multimeters

DC Source: TDK-Lambda

Ambient Temperature at 25DegC

Oscilloscope: TDS3034C

1.4 Testing Setup Photos



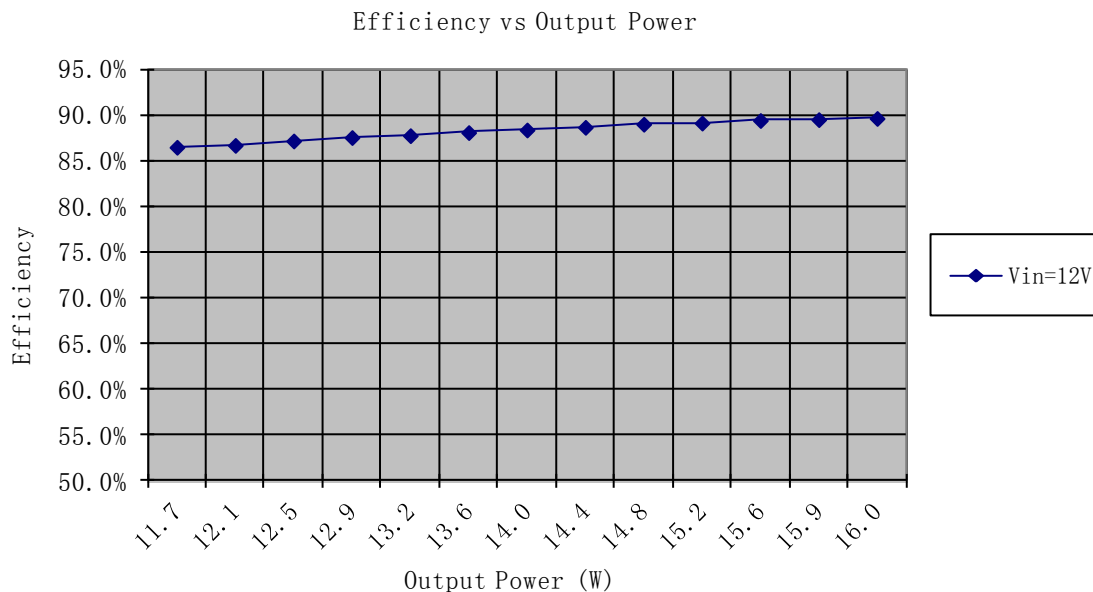
2 INPUT & Output CHARACTERISTICS

2.1: Efficiency Testing

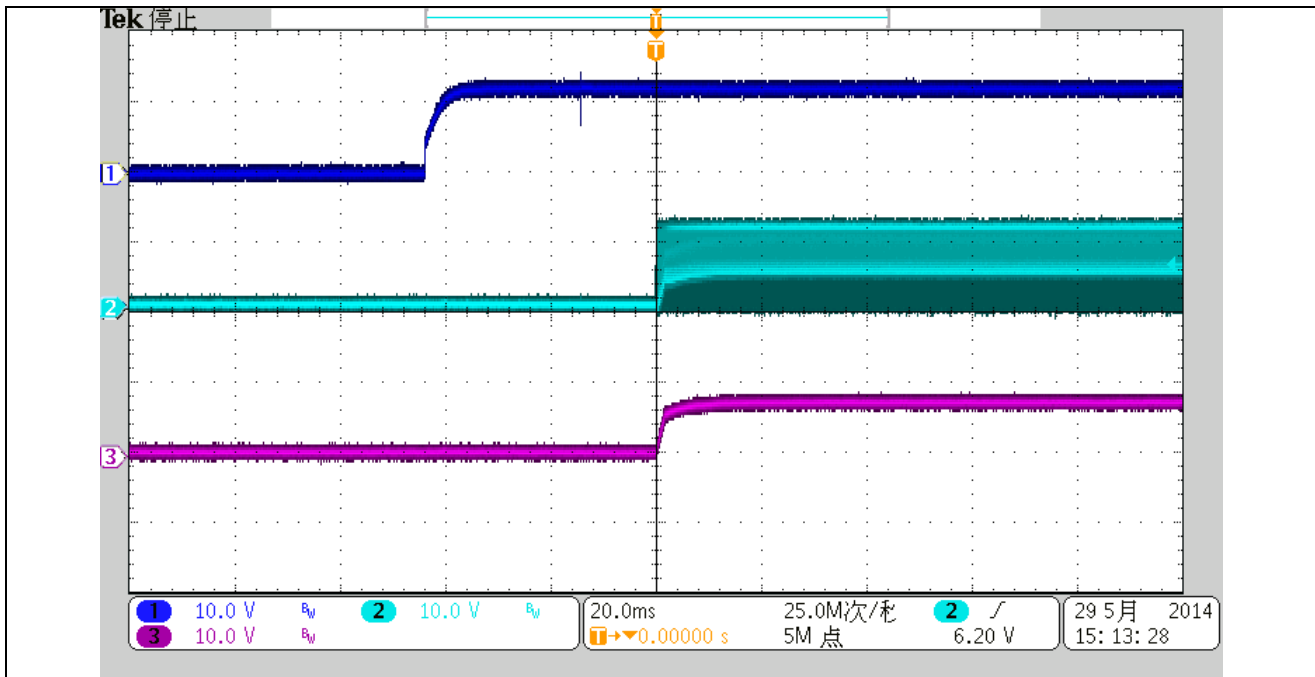
For the BQ24133 Efficiency testing, set the E-Load with CV mode.

At the Pout is 16W point, the input choke power loss is 0.07W, the output choke power loss is 0.08W, and the input 2 FETs power loss is 0.16W (Rds=30mΩ + 40 mΩ). The total additional power loss is 0.31W, the DC-DC converter efficiency is 91.3%.

Vin (V)	Iin (A)	Vout (V)	Iout (A)	Pout(W)	Eff. (%)	Pass /Fail
12V Input						
12.40	1.0921	6.06	1.933	11.7	86.5%	
12.36	1.1268	6.25	1.932	12.1	86.7%	
12.31	1.1611	6.45	1.932	12.5	87.2%	
12.27	1.1989	6.67	1.931	12.9	87.6%	
12.23	1.2342	6.86	1.931	13.2	87.8%	
12.18	1.2705	7.06	1.931	13.6	88.1%	
12.13	1.3046	7.25	1.929	14.0	88.4%	
12.09	1.3435	7.47	1.928	14.4	88.7%	
12.05	1.3795	7.67	1.929	14.8	89.0%	
12.01	1.4164	7.86	1.929	15.2	89.1%	
11.96	1.4539	8.06	1.929	15.6	89.4%	
11.90	1.4959	8.26	1.929	15.9	89.5%	
11.88	1.5009	8.29	1.928	16.0	89.7%	



2.2: Start-Up and Power-Off

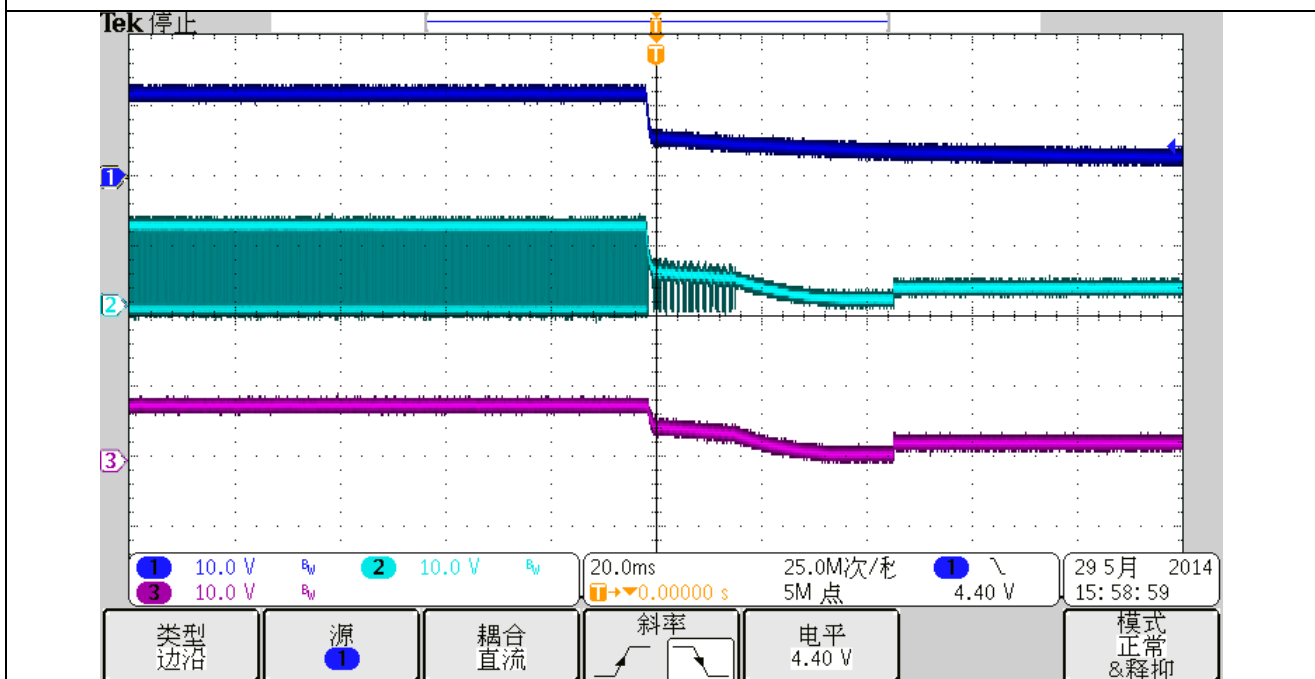


Start-Up With Full Load (8.0V2A)

CH1: Input Voltage 10V/Div

CH2: Vsw Voltage 10.0V/Div

CH3: Output Voltage 10.0V/Div



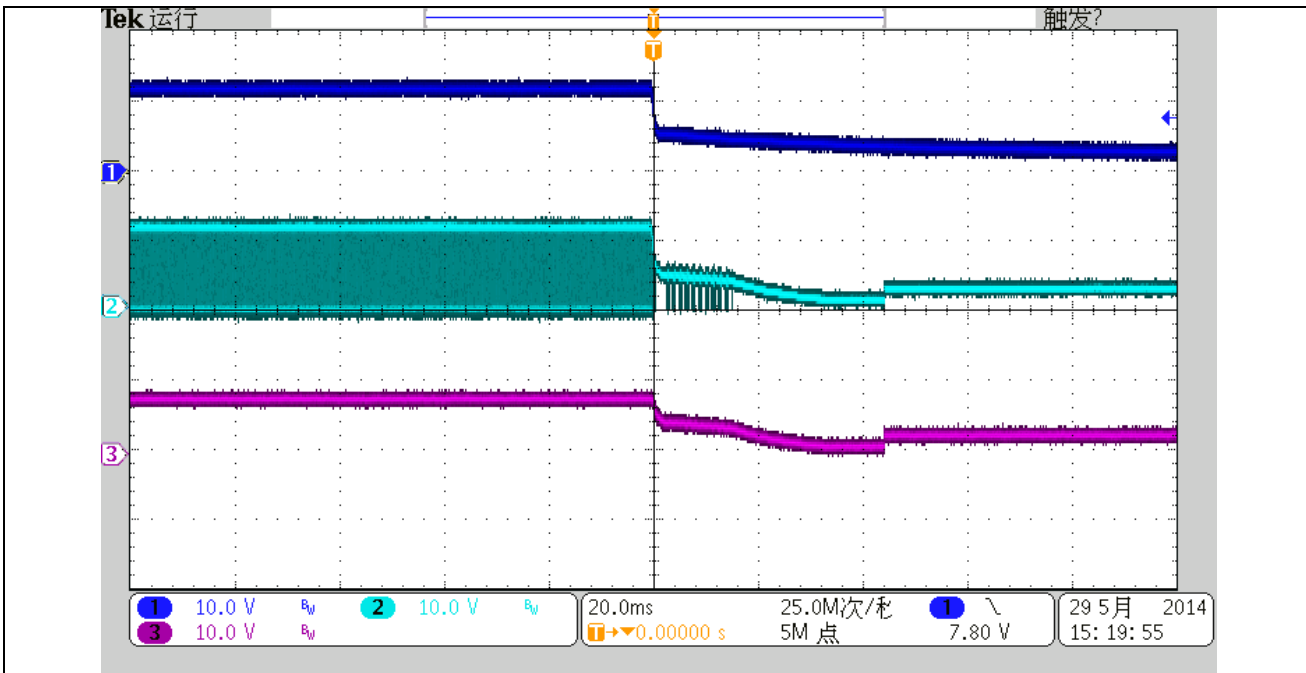
Power-Off With Full Load (8.0V2A)

CH1: Input Voltage 10V/Div

CH2: Vsw Voltage 10.0V/Div

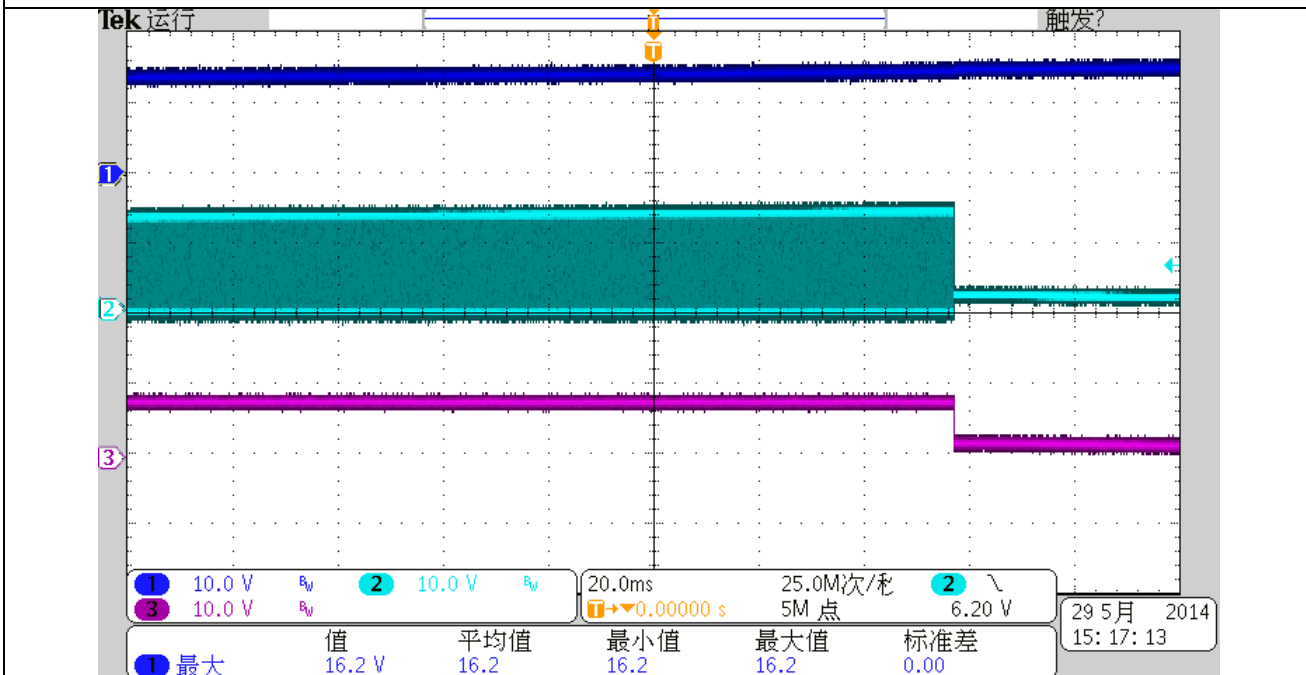
CH3: Output Voltage 10.0V/Div

2.3: Input UVP and OVP



Input UVP With Full Load (8.0V2A)

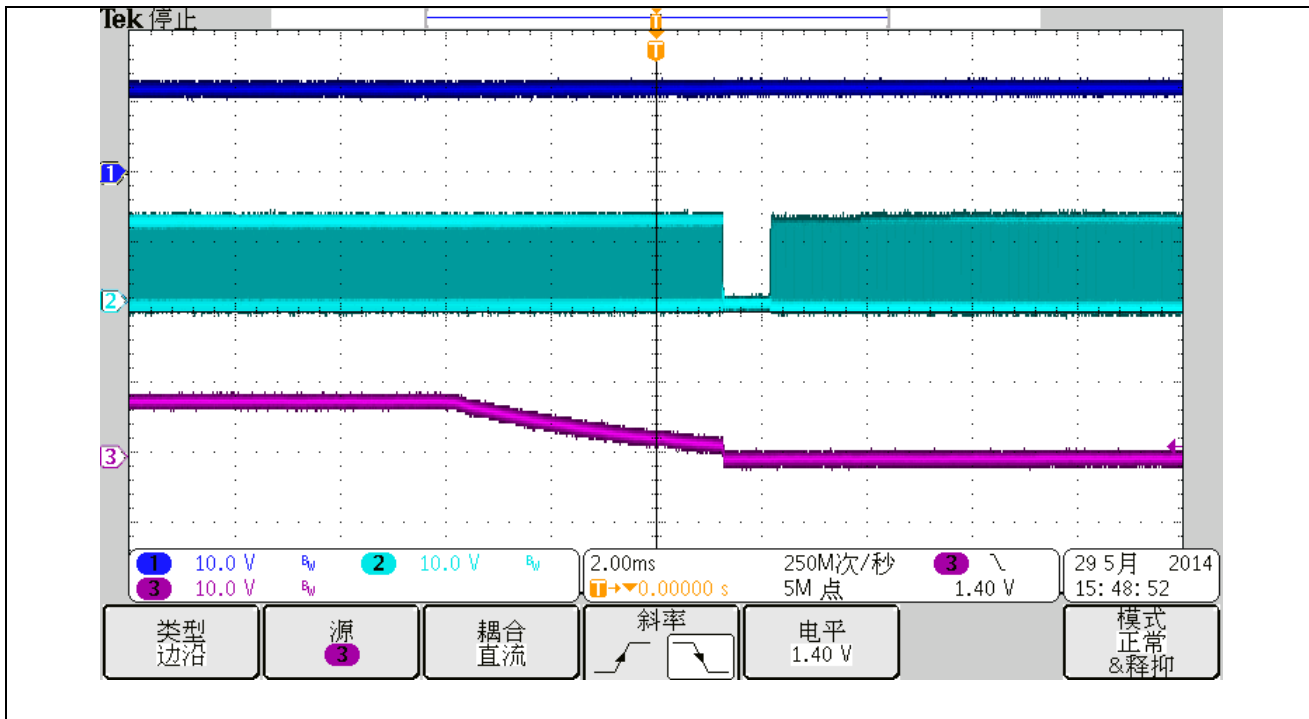
CH1: Input Voltage 10V/Div CH2: Vsw Voltage 10.0V/Div CH3: Output Voltage 10.0V/Div



Input OVP With Full Load (8.0V2A)

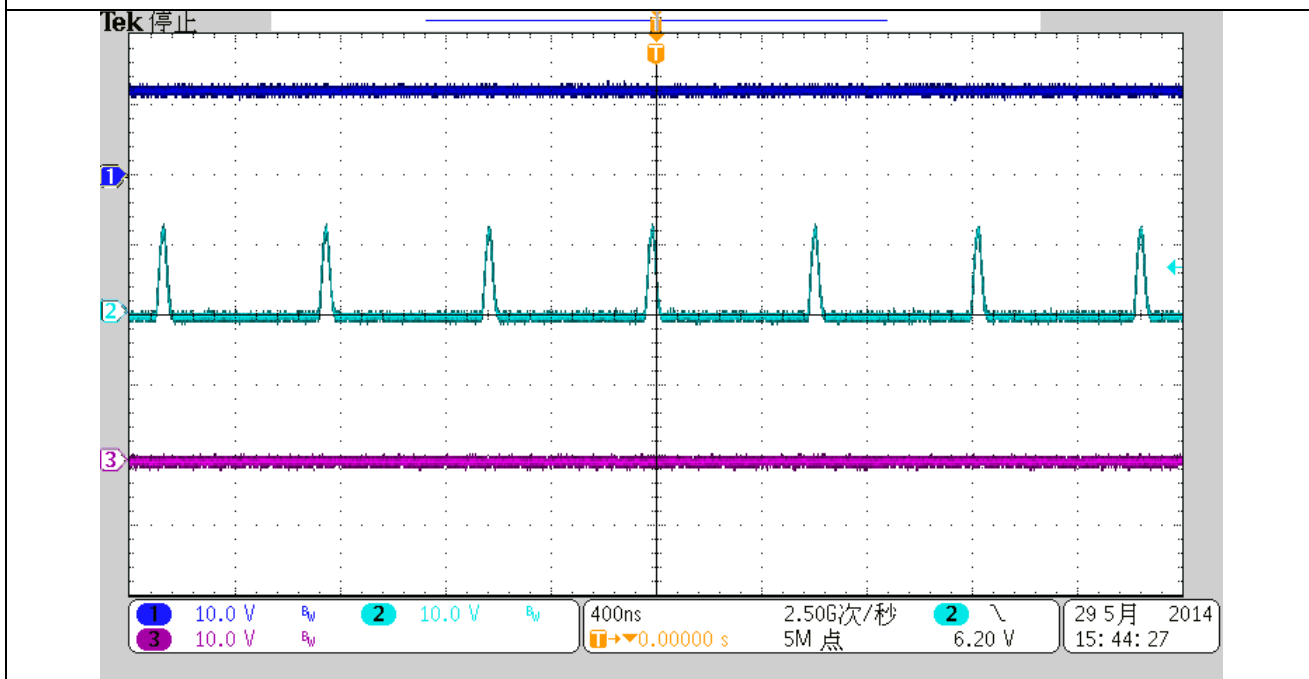
CH1: Input Voltage 10V/Div CH2: Vsw Voltage 10.0V/Div CH3: Output Voltage 10.0V/Div

2.4: Output Short Protection



Output Short With Full Load (8.0V2A)

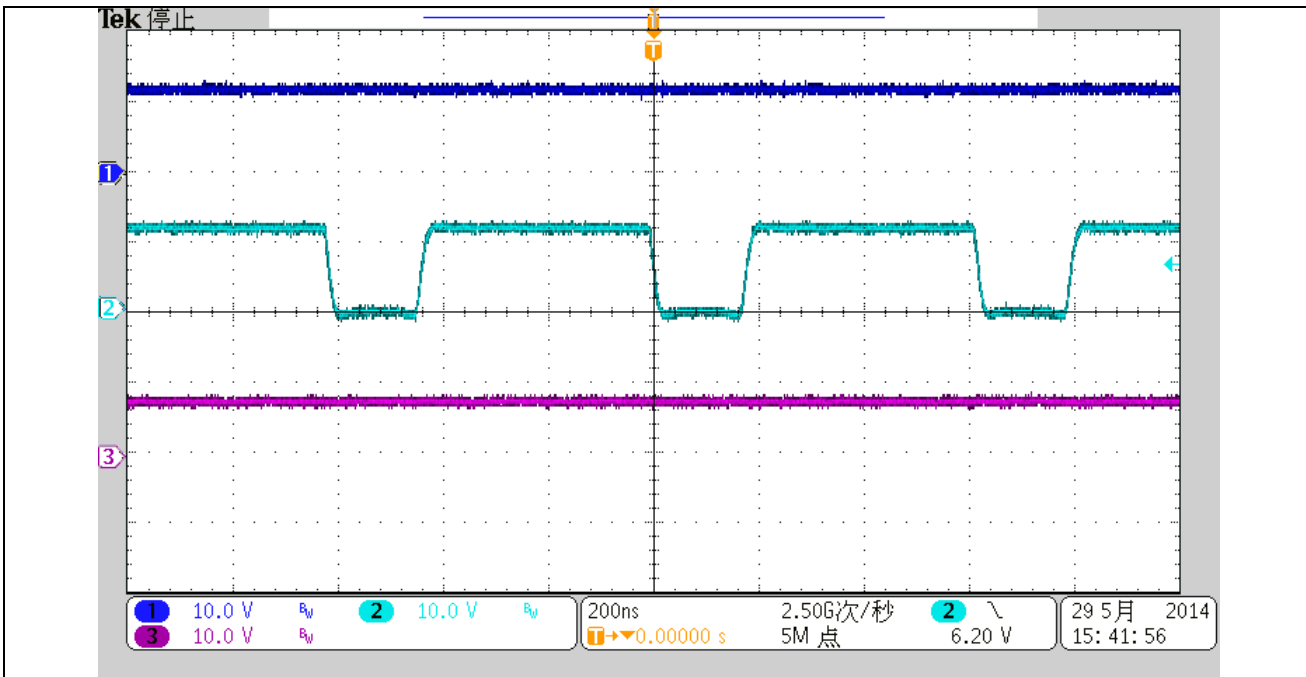
CH1: Input Voltage 10V/Div CH2: Vsw Voltage 10.0V/Div CH3: Output Voltage 10.0V/Div



Output Short With Full Load (8.0V2A)

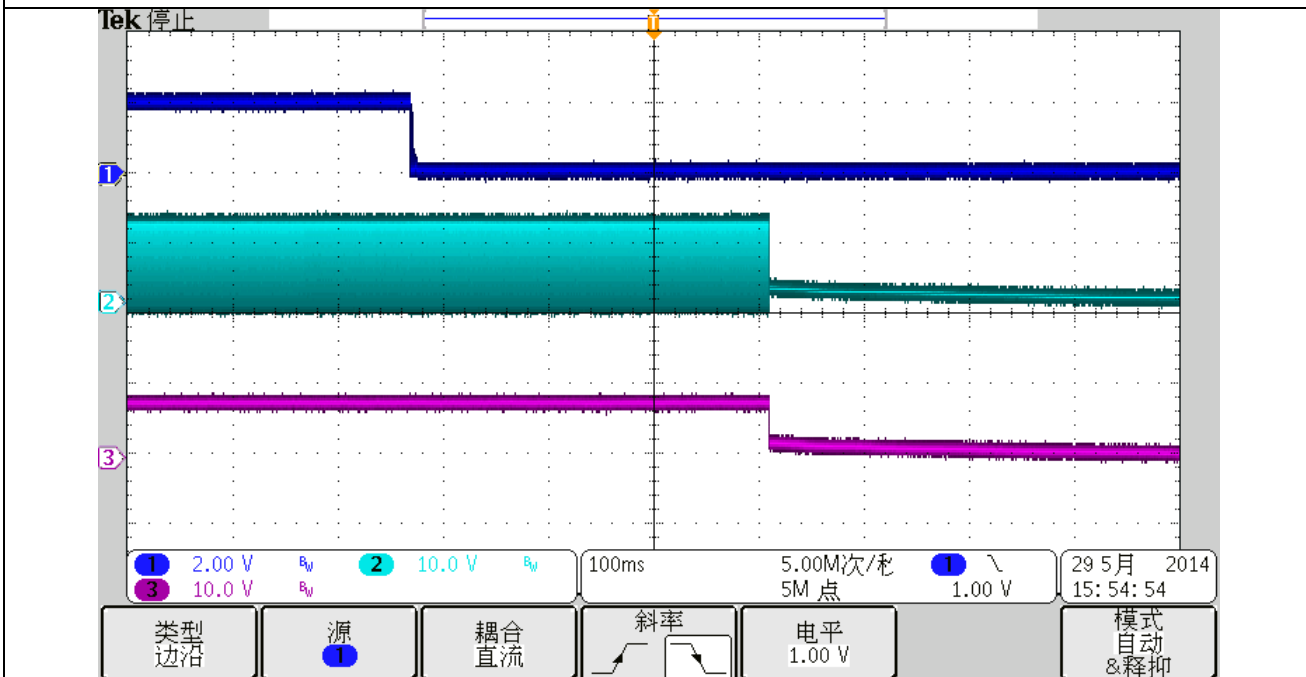
CH1: Input Voltage 10V/Div CH2: Vsw Voltage 10.0V/Div CH3: Output Voltage 10.0V/Div

2.5: Vds Waveforms and OTP Protection



Vds Waveforms With Full Load (8.0V2A)

CH1: Input Voltage 10V/Div CH2: Vsw Voltage 10.0V/Div CH3: Output Voltage 10.0V/Div

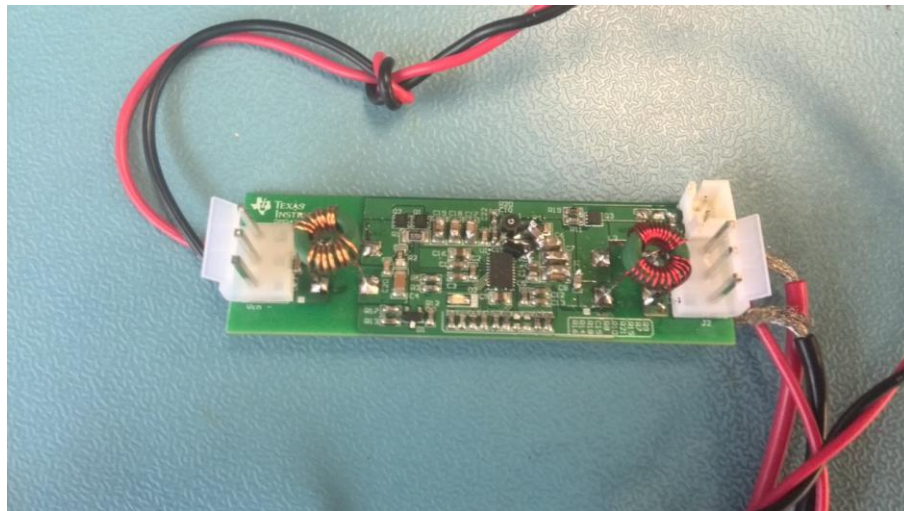
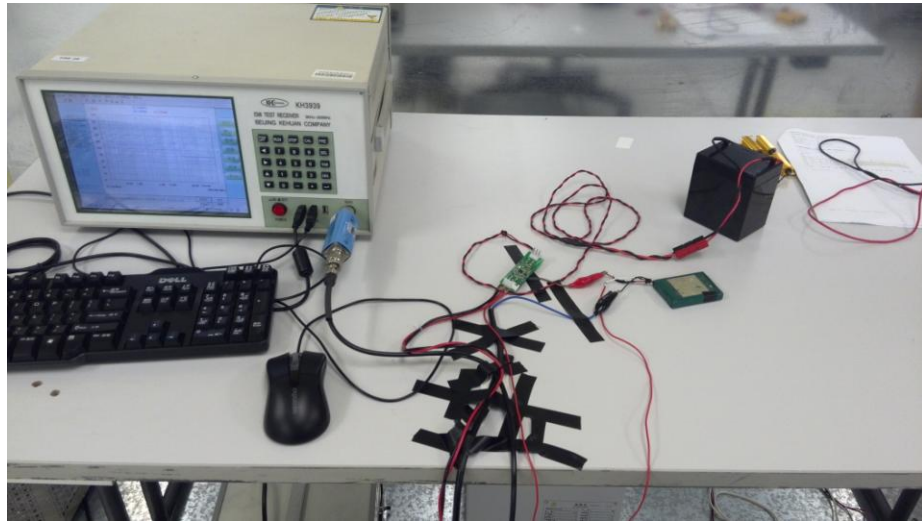


OTP Trigger With Full Load (8.0V2A)

CH1: NTC (TS) Voltage 2.0V/Div CH2: Vsw Voltage 10.0V/Div CH3: Output Voltage 10.0V/Div

2.6: Conducted Emission Testing Results on the VBAT Port

Setup Photo



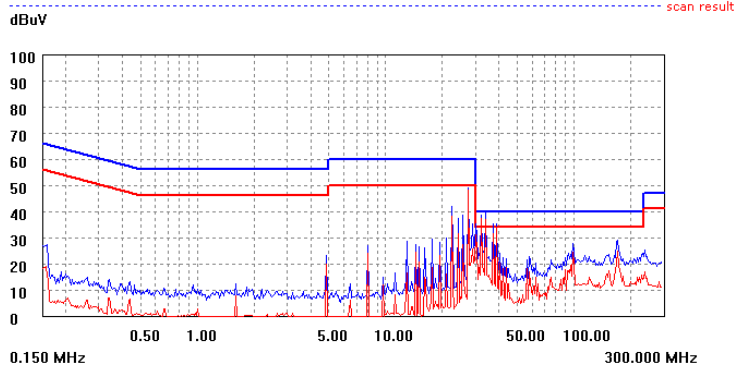
Conducted Emission Testing Results

EMI TEST REPORT

Organization: TI	Operator: Jason Yu	EUT: PMP4397
Place: SZ	Time: 2014/3/12/16:25	Test equipment: KH3939
Detector: PK+AV	Test-time(ms): 20	SN: 1139203
Limit: EN55022-3-1G	Transducer(PK/AV): PK1 / AV1	

Remark: L Line. Add the common choke on the output port VBAT. Add freewheel diode, capacitor+1nF after L

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

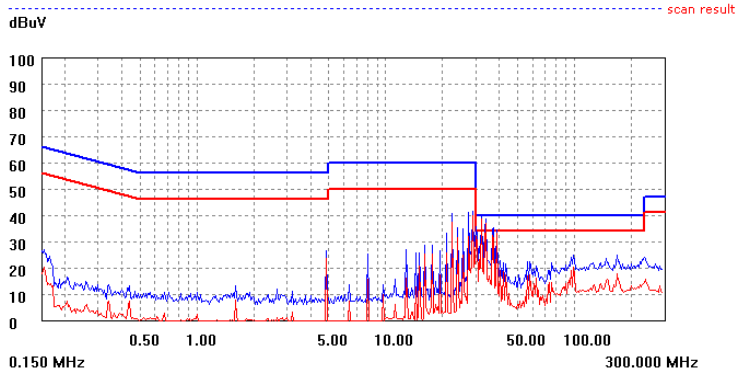


EMI TEST REPORT

Organization: TI	Operator: Jason Yu	EUT: PMP4397
Place: SZ	Time: 2014/3/12/16:28	Test equipment: KH3939
Detector: PK+AV	Test-time(ms): 20	SN: 1139203
Limit: EN55022-3-1G	Transducer(PK/AV): PK1 / AV1	

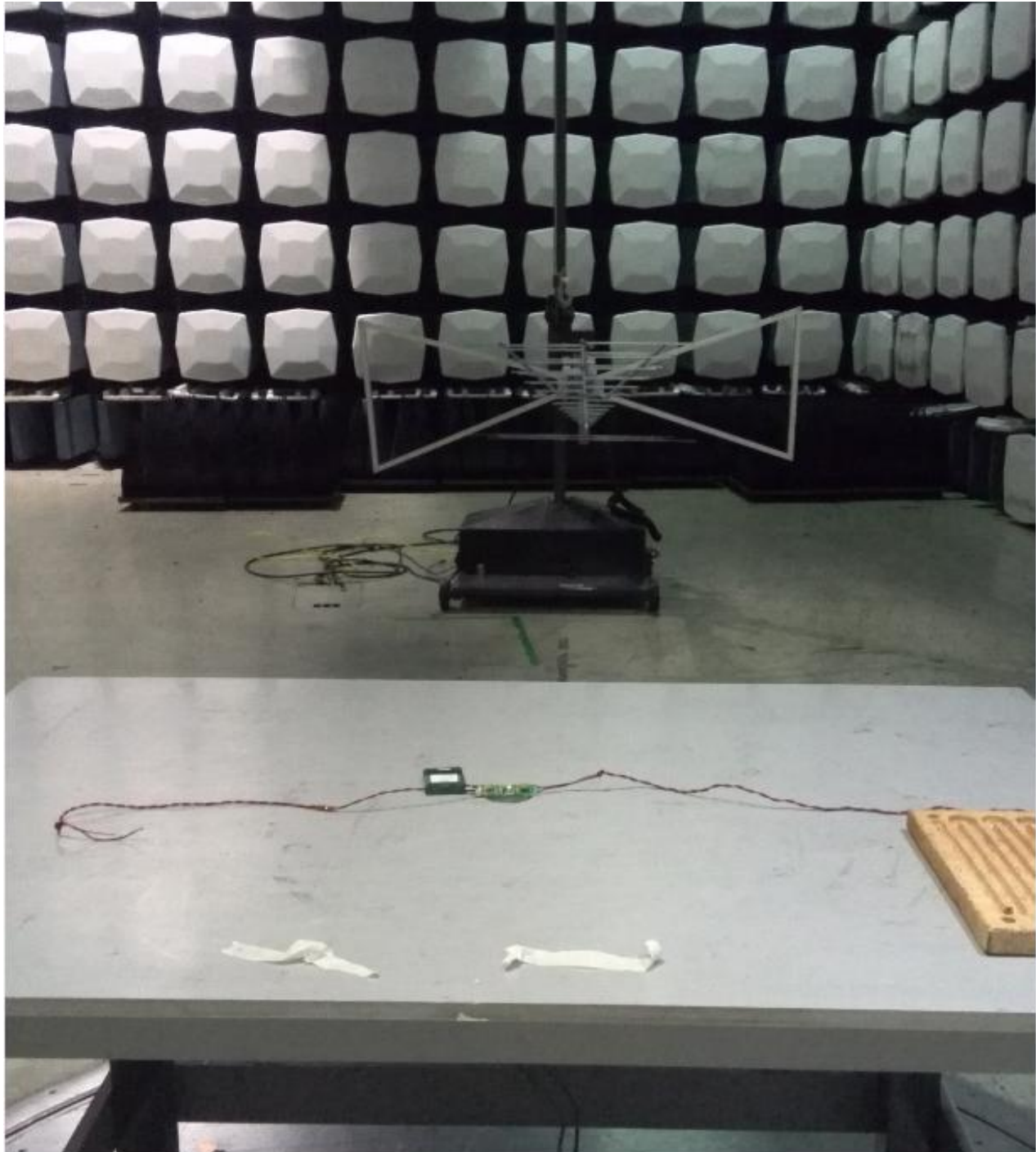
Remark: L Line. Add the common choke on the output port VBAT. Add freewheel diode, capacitor+1nF after L

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



2.3: Radiated Emission Testing Results

Setup Photo

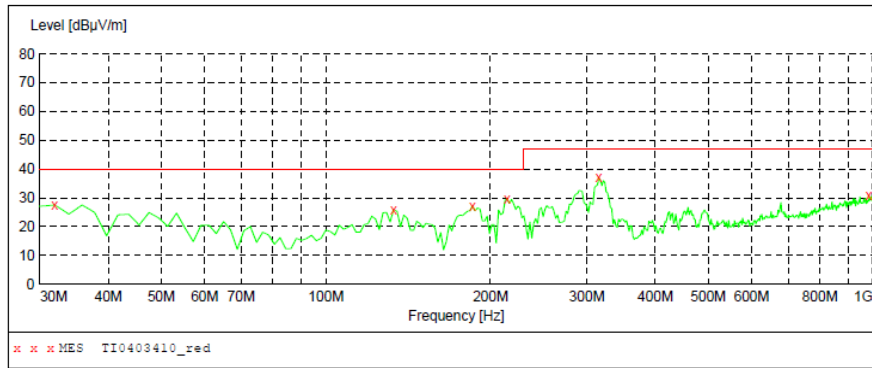


Vertical

EUT: PMP4397 4#
 Manufacturer: TI
 Operating Condition: FULL LOAD
 Test Site: 3M CHAMBER
 Operator: KAIJIN.LI
 Test Specification: DC 12V
 Comment:
 Start of Test: 4/3/2014 / 5:18:33PM

SWEEP TABLE: "test (30M-1G)"

Short Description: Field Strength
 Unit: dBuV/m
 Detector: Mode:

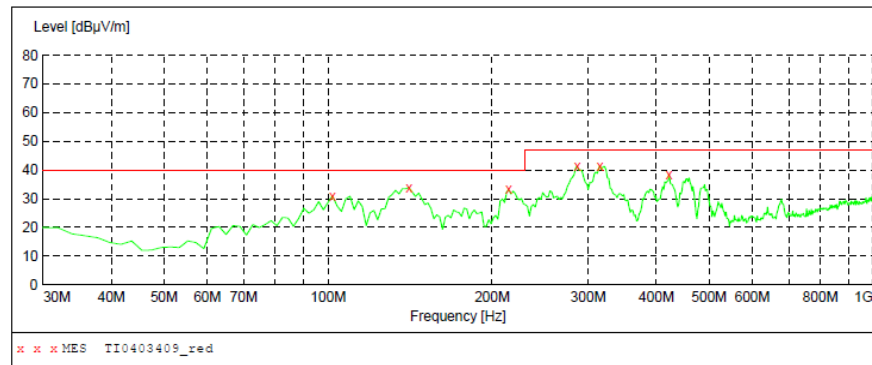


Horizontal

EUT: PMP4397 4#
 Manufacturer: TI
 Operating Condition: FULL LOAD
 Test Site: 3M CHAMBER
 Operator: KAIJIN.LI
 Test Specification: DC 12V
 Comment:
 Start of Test: 4/3/2014 / 5:16:05PM

SWEEP TABLE: "test (30M-1G)"

Short Description: Field Strength
 Unit: dBuV/m
 Detector: Mode:



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