

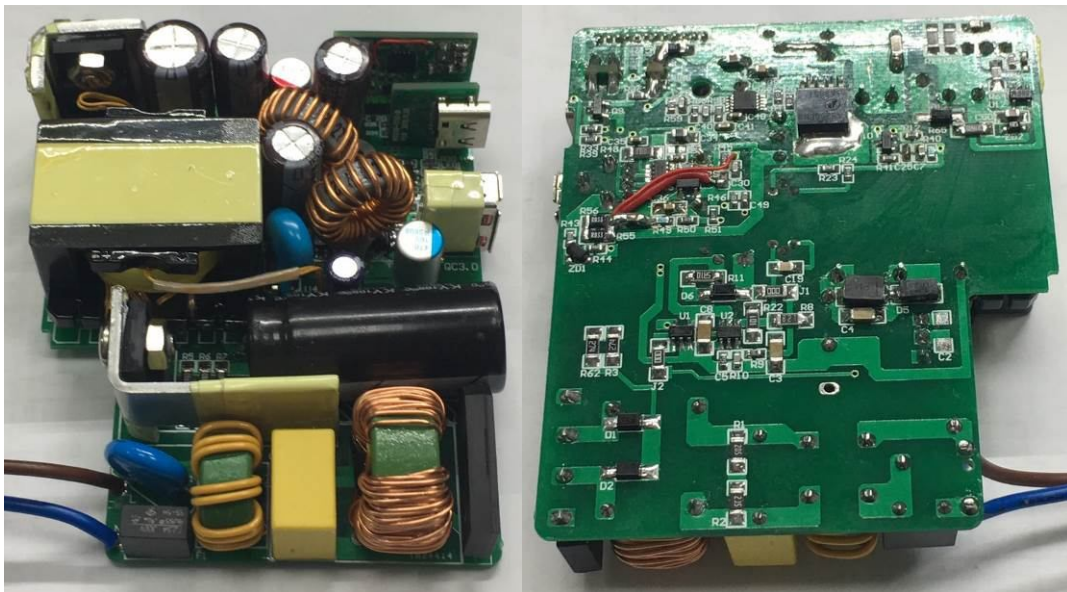


Demo Board Test Report  
IC MODEL NO  
**TYPE-C PD(QC3.0)**  
**+QC3.0雙組輸出**

DATE: 2016/11/21

WRITTEN: 周鉅紘

## Demo Board Reports For Customer :



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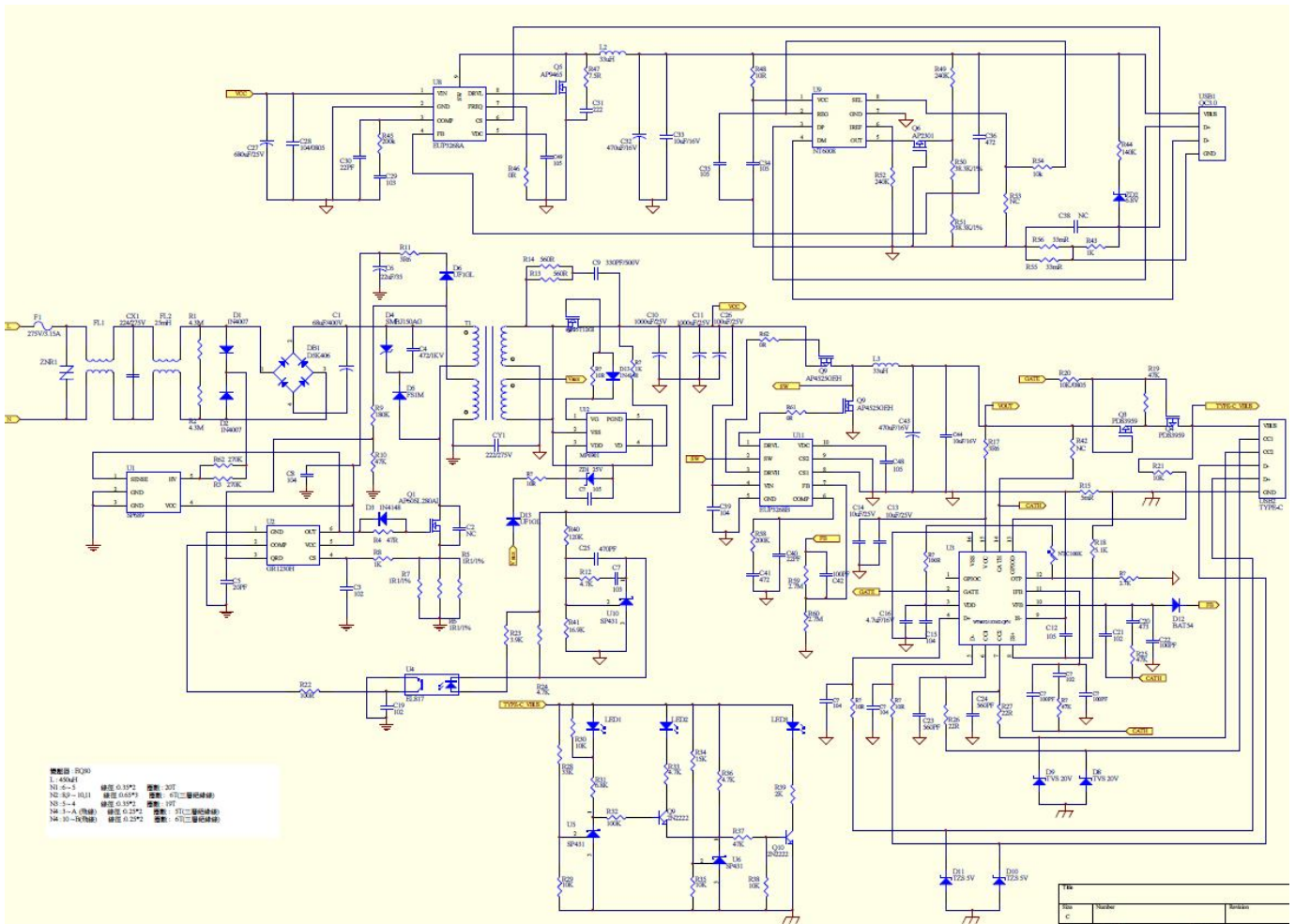


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## 1 Demo board Design Circuit



## 2 Electrical Requirements

### .Input Voltage :

Normal voltage: 100 to 240VACrms

Voltage range : 90 to 264VACrms

### .Frequency

Normal frequency :50Hz - 60Hz

Frequency range : 47Hz - 63Hz

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**.Efficiency**

**TYPE-C :**

- The output voltage 5v average efficiency shall not be less than 76.41%
- The output voltage 9v average efficiency shall not be less than 80.81%
- The output voltage 12v average efficiency shall not be less than 81.6%
- The output voltage 15v average efficiency shall not be less than 81.6%
- The output voltage 20v average efficiency shall not be less than 81.6%
- Both 110Vac(60Hz) and 230Vac(60Hz) input voltage condition.
- Average (25%+50%+75%+100%)/4
- The DC power supply shall be operated at 100% of nameplate current output for at least 30 minutes immediately prior to conducting

**QC3.0 :**

- The output voltage 5v average efficiency shall not be less than 76.41%
- The output voltage 9v average efficiency shall not be less than 77.77%
- The output voltage 12v average efficiency shall not be less than 77.77%
- Both 110Vac(60Hz) and 230Vac(60Hz) input voltage condition.
- Average (25%+50%+75%+100%)/4
- The DC power supply shall be operated at 100% of nameplate current output for at least 30 minutes immediately prior to conducting

**Power Loss (Minimum Load Power Consumption )**

**TYOE-C**

CONDITION		RESULT(SPEC)
INPUT VOLTAGE	230VAC	0.3W MAX (INPUT POWER)
OUTPUT VOLTAGE	+ 5.0 V / No Load	AT 230Vac/50Hz

**QC3.0**

CONDITION		RESULT(SPEC)
INPUT VOLTAGE	230VAC	0.3W MAX (INPUT POWER)
OUTPUT VOLTAGE	+ 5 V / No Load	AT 230Vac/50Hz

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## Output Requirements

**Maximum Output Power : 48Watts (TYPE-C 30W / QC3.0 18W )**

**Output Voltage and Current :**

### TYPE-C

OUTPUT VOLTAGE	MINIMUM VOLTAGE	MAXIMUM VOLTAGE	OUTPUT CURRENT	INPUT VOLTAGE
+5.00VDC	+4.75VDC	+5.25VDC	0.0A~3.0A	100Vac-240Vac
+9.00VDC	+8.55VDC	+9.45VDC	0.0A~3.0A	100Vac-240Vac
+12.00VDC	+11.40VDC	+12.60VDC	0.0A~2.5A	100Vac-240Vac
+15.00VDC	+14.25VDC	+15.75VDC	0.0A~2.0A	100Vac-240Vac
+20.00VDC	+19.00VDC	+21.00VDC	0.0A~1.5A	100Vac-240Vac

### QC3.0

OUTPUT VOLTAGE	MINIMUM VOLTAGE	MAXIMUM VOLTAGE	OUTPUT CURRENT	INPUT VOLTAGE
+5.00VDC	+4.75VDC	+5.25VDC	0.0A~3.0A	100Vac-240Vac
+9.00VDC	+8.55VDC	+9.45VDC	0.0A~2.0A	100Vac-240Vac
+12.00VDC	+11.40VDC	+12.60VDC	0.0A~1.5A	100Vac-240Vac

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### Output Load Regulation :

The output voltage regulation shall meet above table 1, including the effects of line voltage variations, load current, ripple and noise, and the AC component of the load current . The effect of dynamic load changes is not included in this limit.

### Ripple and Noise

A	B
5.0Vdc	0.10Vp-p(100mV)
9.0Vdc	0.20Vp-p(200mV)
12.0Vdc	0.20Vp-p(200mV)
15.0Vdc	0.20Vp-p(200mV)
20.0Vdc	0.20Vp-p(200mV)

Column A : Output Voltage.

Column B: Switching Ripple and Noise

Measured methods:

- 1.Performed by 20M Hz bandwidth in oscilloscope.
- 2.Applied 0.1uF high frequency capacitor and 47uF electrolytic capacitor across the end of DC cable.
- 3.Measured at the end of DC cable.
- 4.Tested at 110Vac(60Hz) and 230Vac(60Hz).

### Protection Requirements

#### Over Current Protection

##### TYPE-C :

The output voltage 5v : 3.6A min @input 100~240Vac 50/60 Hz  
The output voltage 9v : 3.6A min @input 100~240Vac 50/60 Hz  
The output voltage 12v : 3.0A min @input 100~240Vac 50/60 Hz  
The output voltage 15v : 2.4A min @input 100~240Vac 50/60 Hz  
The output voltage 20v : 2.0A min @input 100~240Vac 50/60 Hz

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### Short Circuit Protection

The input power shall decrease when the DC output "+" and "-" short, the power supply shall no damage, and shall be self-recovery when the fault condition is removed.

### Over Voltage Protection(Auto-recovery)

The power supply shall protection when the output over voltage, the power supply shall no damage.

### Level VI 能效要求

<b>Table 1: Proposed Energy Conservation Standards for Direct Operation External Power Supplies</b>		
<b>AC-DC, Basic-Voltage External Power Supply</b>		
<b>Nameplate Output Power (Pout)</b>	<b>Minimum Average Efficiency in Active Mode (expressed as a decimal)</b>	<b>Maximum Power in No-Load Mode [W]</b>
0 to $\leq$ 1 watt	$\geq 0.5 * P_{out} + 0.16$	$\leq 0.100$
> 1 to $\leq$ 49 watts	$\geq 0.071 * \ln(P_{out}) - 0.0014 * P_{out} + 0.67$	$\leq 0.100$
> 49 watts to $\leq$ 250 watts	$\geq 0.880$	$\leq 0.210$
> 250 watts	0.875	$\leq 0.500$

<b>AC-DC, Low-Voltage (&lt;6V) External Power Supply</b>		
<b>Nameplate Output Power (Pout)</b>	<b>Minimum Average Efficiency in Active Mode (expressed as a decimal)</b>	<b>Maximum Power in No-Load Mode [W]</b>
0 to $\leq$ 1 watt	$\geq 0.517 * P_{out} + 0.087$	$\leq 0.100$
> 1 to $\leq$ 49 watts	$\geq 0.0834 * \ln(P_{out}) - 0.0014 * P_{out} + 0.609$	$\leq 0.100$
> 49 watts to $\leq$ 250 watts	$\geq 0.870$	$\leq 0.210$
> 250 watts	0.875	$\leq 0.500$

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Multiple-Voltage External Power Supply		
Nameplate Output Power (Pout)	Minimum Average Efficiency in Active Mode (expressed as a decimal)	Maximum Power in No-Load Mode [W]
0 to $\leq$ 1 watt	$\geq 0.497 \times P_{out} + 0.067$	$\leq 0.300$
> 1 to $\leq$ 49 watts	$\geq 0.075 \times \ln(P_{out}) + 0.561$	$\leq 0.300$
> 49 watts	$\geq 0.860$	$\leq 0.300$

### 3 Performance Test report

TYPE-C ( WT6632F )

Vout : 5VDC

Vin(VAC)	負載百分比	Iout( A )	Pin(W)	Vout ( V )	Efficiency	輸出漣波 (mV)
110(60hz)	0%	0	0.241	4.982		
110(60hz)	10%	0.3	2.0934	4.988	71.48%	42
110(60hz)	25%	0.75	4.7128	4.961	78.95%	51
110(60hz)	50%	1.5	9.1884	4.941	80.66%	60
110(60hz)	75%	2.25	13.909	4.893	79.15%	71
110(60hz)	100%	3	18.95	4.881	77.27%	76
average efficiency :					79.01%	
多電源輸出 Level VI 能效要求 :					76.41%	

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		<b>WRITTEN: 周鉅紘</b>

**Vout : 9VDC**

Vin(VAC)	負載百分比	Iout( A )	Pin(W)	Vout ( V )	Efficiency	輸出漣波 (mV)
110(60hz)	10%	0.3	3.5198	9.109	77.64%	47
110(60hz)	25%	0.75	8.1519	9.081	83.55%	55
110(60hz)	50%	1.5	16.008	9.052	84.82%	67
110(60hz)	75%	2.25	24.162	9.038	84.16%	74
110(60hz)	100%	3	32.704	9.025	82.79%	85
average efficiency :					83.83%	
多電源輸出 Level VI 能效要求 :					80.81%	

**Vout : 12VDC**

Vin(VAC)	負載百分比	Iout( A )	Pin(W)	Vout ( V )	Efficiency	輸出漣波 (mV)
110(60hz)	10%	0.25	3.7881	11.96	78.93%	45
110(60hz)	25%	0.625	8.8314	11.945	84.54%	64
110(60hz)	50%	1.25	17.218	11.895	86.36%	70
110(60hz)	75%	1.875	25.889	11.882	86.05%	74
110(60hz)	100%	2.5	34.817	11.867	85.21%	92
average efficiency :					85.54%	
多電源輸出 Level VI 能效要求 :					81.60%	

**Vout : 15VDC**

Vin(VAC)	負載百分比	Iout( A )	Pin(W)	Vout ( V )	Efficiency	輸出漣波 (mV)
110(60hz)	10%	0.2	3.8094	14.988	78.69%	47
110(60hz)	25%	0.5	8.7854	14.972	85.21%	59
110(60hz)	50%	1	17.113	14.907	87.11%	76
110(60hz)	75%	1.5	25.587	14.897	87.33%	79
110(60hz)	100%	2	34.267	14.88	86.85%	92
average efficiency :					86.62%	
多電源輸出 Level VI 能效要求 :					81.60%	

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**Vout : 20VDC**

Vin(VAC)	負載百分比	Iout( A )	Pin(W)	Vout ( V )	Efficiency	輸出漣波 (mV)
110(60hz)	10%	0.15	3.78	19.902	78.98%	47
110(60hz)	25%	0.375	8.4312	19.886	88.45%	67
110(60hz)	50%	0.75	16.86	19.86	88.35%	80
110(60hz)	75%	1.125	25.223	19.834	88.46%	88
110(60hz)	100%	1.5	33.587	19.802	88.44%	96
average efficiency :					88.42%	
多電源輸出 Level VI 能效要求 :					81.60%	

**Vout : 5VDC**

Vin(VAC)	負載百分比	Iout( A )	Pin(W)	Vout ( V )	Efficiency	輸出漣波 (mV)
230(60hz)	0%	0	0.2507	4.952		
230(60hz)	10%	0.3	2.0911	4.973	71.35%	64
230(60hz)	25%	0.75	4.7278	4.959	78.67%	76
230(60hz)	50%	1.5	9.2277	4.932	80.17%	81
230(60hz)	75%	2.25	13.967	4.917	79.21%	85
230(60hz)	100%	3	19.029	4.902	77.28%	95
average efficiency :					78.83%	
多電源輸出 Level VI 能效要求 :					76.41%	

**Vout : 9VDC**

Vin(VAC)	負載百分比	Iout( A )	Pin(W)	Vout ( V )	Efficiency	輸出漣波 (mV)
230(60hz)	10%	0.3	3.5132	9.09	77.62%	50
230(60hz)	25%	0.75	8.2119	9.066	82.80%	82
230(60hz)	50%	1.5	15.924	9.002	84.80%	110
230(60hz)	75%	2.25	24.014	8.987	84.20%	113
230(60hz)	100%	3	32.422	8.973	83.03%	116
average efficiency :					83.71%	
多電源輸出 Level VI 能效要求 :					80.81%	

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**Vout : 12VDC**

Vin(VAC)	負載百分比	Iout( A )	Pin(W)	Vout ( V )	Efficiency	輸出漣波 (mV)
230(60hz)	10%	0.25	3.8062	11.913	78.25%	77
230(60hz)	25%	0.625	8.8747	11.91	83.88%	80
230(60hz)	50%	1.25	17.202	11.853	86.13%	101
230(60hz)	75%	1.875	25.75	11.8752	86.47%	112
230(60hz)	100%	2.5	34.513	11.823	85.64%	114
average efficiency :					85.53%	
多電源輸出 Level VI 能效要求 :					81.60%	

**Vout : 15VDC**

Vin(VAC)	負載百分比	Iout( A )	Pin(W)	Vout ( V )	Efficiency	輸出漣波 (mV)
230(60hz)	10%	0.2	3.7955	14.947	78.76%	62
230(60hz)	25%	0.5	8.8482	14.937	84.41%	78
230(60hz)	50%	1	17.075	14.877	87.13%	104
230(60hz)	75%	1.5	25.496	14.858	87.41%	112
230(60hz)	100%	2	33.984	14.842	87.35%	110
average efficiency :					86.57%	
多電源輸出 Level VI 能效要求 :					81.60%	

**Vout : 20VDC**

Vin(VAC)	負載百分比	Iout( A )	Pin(W)	Vout ( V )	Efficiency	輸出漣波 (mV)
230(60hz)	10%	0.15	3.7802	19.762	78.42%	71
230(60hz)	25%	0.375	8.4359	19.748	87.79%	72
230(60hz)	50%	0.75	16.783	19.724	88.14%	90
230(60hz)	75%	1.125	24.941	19.696	88.84%	104
230(60hz)	100%	1.5	33.172	19.67	88.95%	110
average efficiency :					88.43%	
多電源輸出 Level VI 能效要求 :					81.60%	

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QC ( WT6632F )

Vout : 5VDC

Vin(VAC)	負載百分比	Iout( A )	Pin(W)	Vout ( V )	Efficiency	輸出漣波 (mV)
110(60Hz)	0%	0	0.238	5.002		
110(60Hz)	10%	0.3	2.1144	5.009	71.07%	58
110(60Hz)	25%	0.75	4.7488	4.978	78.62%	64
110(60Hz)	50%	1.5	9.2464	4.948	80.27%	75
110(60Hz)	75%	2.25	14.016	4.906	78.76%	81
110(60Hz)	100%	3	19.107	4.877	76.57%	91
average efficiency :					78.55%	
多電源輸出 Level VI 能效要求 :					76.41%	

Vout : 9VDC

Vin(VAC)	負載百分比	Iout( A )	Pin(W)	Vout ( V )	Efficiency	輸出漣波 (mV)
110(60Hz)	10%	0.3	3.536	9.109	77.28%	55
110(60Hz)	25%	0.75	8.1705	9.074	83.29%	70
110(60Hz)	50%	1.5	16.045	9.035	84.47%	80
110(60Hz)	75%	2.25	24.228	9.008	83.66%	87
110(60Hz)	100%	3	32.733	8.981	82.31%	92
average efficiency :					83.43%	
多電源輸出 Level VI 能效要求 :					80.81%	

Vout : 12VDC

Vin(VAC)	負載百分比	Iout( A )	Pin(W)	Vout ( V )	Efficiency	輸出漣波 (mV)
110(60Hz)	10%	0.25	3.798	11.958	78.71%	52
110(60Hz)	25%	0.625	8.8512	11.941	84.32%	73
110(60Hz)	50%	1.25	16.922	11.881	87.76%	79
110(60Hz)	75%	1.875	25.914	11.857	85.79%	87
110(60Hz)	100%	2.5	34.838	11.833	84.91%	98
average efficiency :					85.70%	
多電源輸出 Level VI 能效要求 :					81.60%	

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**Vout : 5VDC**

Vin(VAC)	負載百分比	Iout( A )	Pin(W)	Vout ( V )	Efficiency	輸出漣波 (mV)
230(60Hz)	0%	0	0.2539	4.97		
230(60Hz)	10%	0.3	2.0972	4.984	71.30%	62
230(60Hz)	25%	0.75	4.7318	4.962	78.65%	74
230(60Hz)	50%	1.5	9.2331	4.93	80.09%	82
230(60Hz)	75%	2.25	13.986	4.91	78.99%	88
230(60Hz)	100%	3	19.023	4.893	77.16%	98
average efficiency :					78.72%	
多電源輸出 Level VI 能效要求 :					76.41%	

**Vout : 9VDC**

Vin(VAC)	負載百分比	Iout( A )	Pin(W)	Vout ( V )	Efficiency	輸出漣波 (mV)
230(60Hz)	10%	0.3	3.5179	9.1	77.60%	56
230(60Hz)	25%	0.75	8.2159	9.077	82.86%	74
230(60Hz)	50%	1.5	16.002	9.039	84.73%	117
230(60Hz)	75%	2.25	24.144	9.023	84.09%	120
230(60Hz)	100%	3	32.521	9.005	83.07%	115
average efficiency :					83.69%	
多電源輸出 Level VI 能效要求 :					80.81%	

**Vout : 12VDC**

Vin(VAC)	負載百分比	Iout( A )	Pin(W)	Vout ( V )	Efficiency	輸出漣波 (mV)
230(60Hz)	10%	0.25	3.8179	11.949	78.24%	62
230(60Hz)	25%	0.625	8.8939	11.941	83.91%	88
230(60Hz)	50%	1.25	17.241	11.88	86.13%	109
230(60Hz)	75%	1.875	25.803	11.861	86.19%	120
230(60Hz)	100%	2.5	34.582	11.846	85.64%	124
average efficiency :					85.47%	
多電源輸出 Level VI 能效要求 :					81.60%	

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QC3.0 ( NT6008 )

Vout : 5VDC

Vin(VAC)	負載百分比	Iout( A )	Pin(W)	Vout ( V )	Efficiency	輸出漣波 (mV)
110(60Hz)	0%	0	0.2396	4.938		
110(60Hz)	10%	0.3	2.1141	4.954	70.30%	44
110(60Hz)	25%	0.75	4.7462	5.012	79.20%	54
110(60Hz)	50%	1.5	9.2344	5.111	83.02%	62
110(60Hz)	75%	2.25	14.083	5.211	83.25%	68
110(60Hz)	100%	3	19.242	5.295	82.55%	74
average efficiency :					82.01%	
多電源輸出 Level VI 能效要求 :					76.41%	

Vout : 9VDC

Vin(VAC)	負載百分比	Iout( A )	Pin(W)	Vout ( V )	Efficiency	輸出漣波 (mV)
110(60Hz)	10%	0.2	2.4214	8.768	72.42%	48
110(60Hz)	25%	0.5	5.5192	8.946	81.04%	52
110(60Hz)	50%	1	10.61	9.038	85.18%	62
110(60Hz)	75%	1.5	15.848	9.114	86.26%	70
110(60Hz)	100%	2	21.245	9.188	86.50%	80
average efficiency :					84.75%	
多電源輸出 Level VI 能效要求 :					77.77%	

Vout : 12VDC

Vin(VAC)	負載百分比	Iout( A )	Pin(W)	Vout ( V )	Efficiency	輸出漣波 (mV)
110(60Hz)	10%	0.15	2.327	11.61	74.84%	48
110(60Hz)	25%	0.375	5.4447	11.893	81.91%	74
110(60Hz)	50%	0.75	10.623	12.137	85.69%	64
110(60Hz)	75%	1.125	15.762	12.206	87.12%	76
110(60Hz)	100%	1.5	19.932	11.603	87.32%	74
average efficiency :					85.51%	
多電源輸出 Level VI 能效要求 :					77.77%	

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	<b>Demo Board Test Report</b> <b>IC MODEL NO</b> <b>TYPE-C PD(QC3.0)</b> <b>+QC3.0雙組輸出</b>	<b>DATE: 2016/11/21</b>
		<b>WRITTEN: 周鉅紘</b>

**Vout : 5VDC**

Vin(VAC)	負載百分比	Iout( A )	Pin(W)	Vout ( V )	Efficiency	輸出漣波 (mV)
230(60Hz)	0%	0	0.257	4.948		
230(60Hz)	10%	0.3	2.1124	4.955	70.37%	52
230(60Hz)	25%	0.75	4.7561	5.01	79.00%	58
230(60Hz)	50%	1.5	9.2697	5.108	82.66%	72
230(60Hz)	75%	2.25	14.065	5.204	83.25%	88
230(60Hz)	100%	3	19.212	5.295	82.68%	96
average efficiency :					81.90%	
多電源輸出 Level VI 能效要求 :					76.41%	

**Vout : 9VDC**

Vin(VAC)	負載百分比	Iout( A )	Pin(W)	Vout ( V )	Efficiency	輸出漣波 (mV)
230(60Hz)	10%	0.2	2.4167	8.767	72.55%	46
230(60Hz)	25%	0.5	5.5432	8.946	80.69%	58
230(60Hz)	50%	1	10.634	9.04	85.01%	84
230(60Hz)	75%	1.5	15.843	9.113	86.28%	94
230(60Hz)	100%	2	21.214	9.189	86.63%	98
average efficiency :					84.65%	
多電源輸出 Level VI 能效要求 :					77.77%	

**Vout : 12VDC**

Vin(VAC)	負載百分比	Iout( A )	Pin(W)	Vout ( V )	Efficiency	輸出漣波 (mV)
230(60Hz)	10%	0.15	2.4326	11.61	71.59%	42
230(60Hz)	25%	0.375	5.4696	11.893	81.54%	86
230(60Hz)	50%	0.75	10.647	12.137	85.50%	86
230(60Hz)	75%	1.125	15.751	12.204	87.17%	94
230(60Hz)	100%	1.5	19.897	11.603	87.47%	96
average efficiency :					85.42%	
多電源輸出 Level VI 能效要求 :					77.77%	

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### 3 Protection Test:

TYPE-C

Output : DC 5V			
Vin(AC)	OVP	OCP	SCP
90	6.5V	3.6A	OK
110	6.5V	3.6A	OK
135	6.5V	3.6A	OK
180	6.5V	3.6A	OK
220	6.5V	3.6A	OK
242	6.5V	3.6A	OK
264	6.5V	3.6A	OK

Output : DC 9V			
Vin(AC)	OVP	OCP	SCP
90	10.8V	3.6A	OK
110	10.8V	3.6A	OK
135	10.8V	3.6A	OK
180	10.8V	3.6A	OK
220	10.8V	3.6A	OK
242	10.8V	3.6A	OK
264	10.8V	3.6A	OK

Output : DC12V			
Vin(AC)	OVP	OCP	SCP
90	14.4V	3A	OK
110	14.4V	3A	OK
135	14.4V	3A	OK
180	14.4V	3A	OK
220	14.4V	3A	OK
242	14.4V	3A	OK
264	14.4V	3A	OK

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Output : DC 15V

Vin(AC)	OVP	OCP	SCP
90	18V	2.4A	OK
110	18V	2.4A	OK
135	18V	2.4A	OK
180	18V	2.4A	OK
220	18V	2.4A	OK
242	18V	2.4A	OK
264	18V	2.4A	OK

Output : DC 20V

Vin(AC)	OVP	OCP	SCP
90	24V	2A	OK
110	24V	2A	OK
135	24V	2A	OK
180	24V	2A	OK
220	24V	2A	OK
242	24V	2A	OK
264	24V	2A	OK





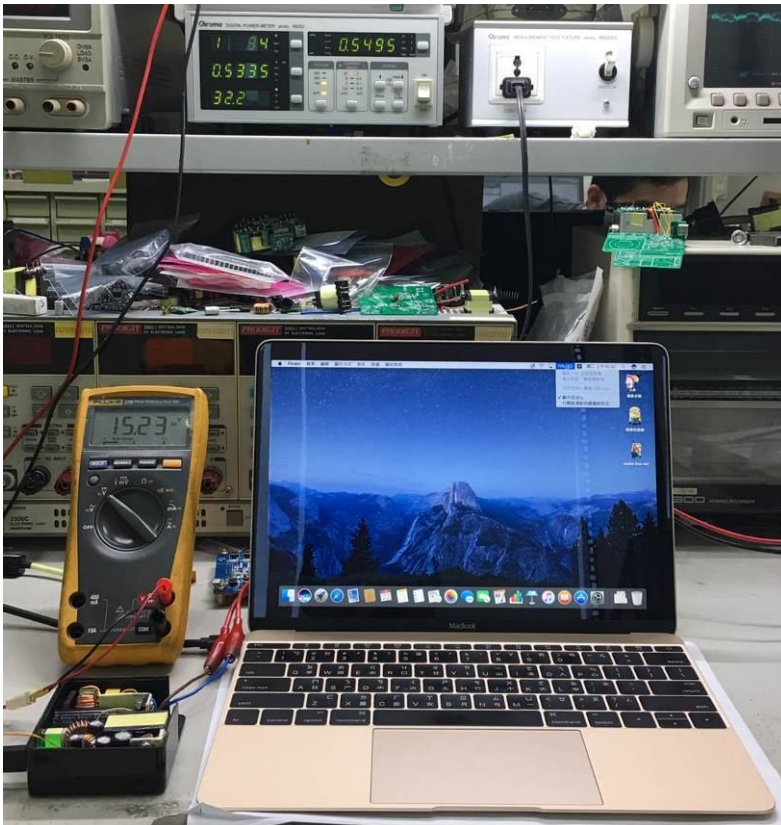
Demo Board Test Report  
IC MODEL NO  
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DATE: 2016/11/21

WRITTEN: 周鉅紘

## 4 TYPE-C PD POWER 相容性 實機充電測試:

### APPLE Macbook 實機充電測試



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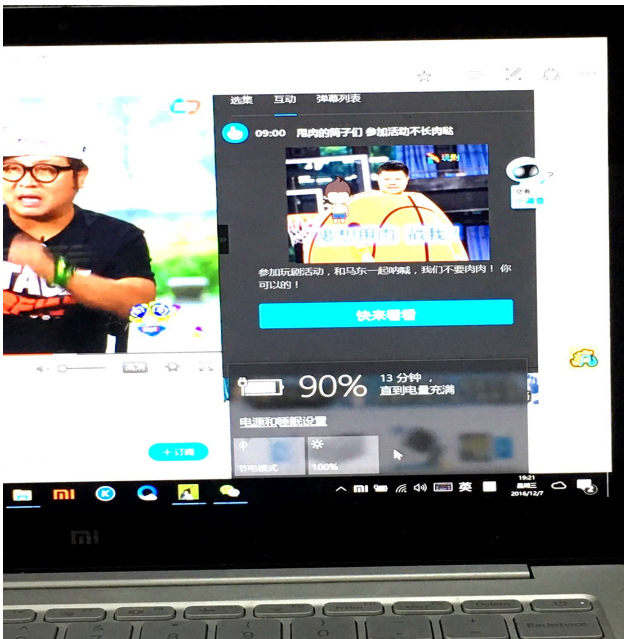
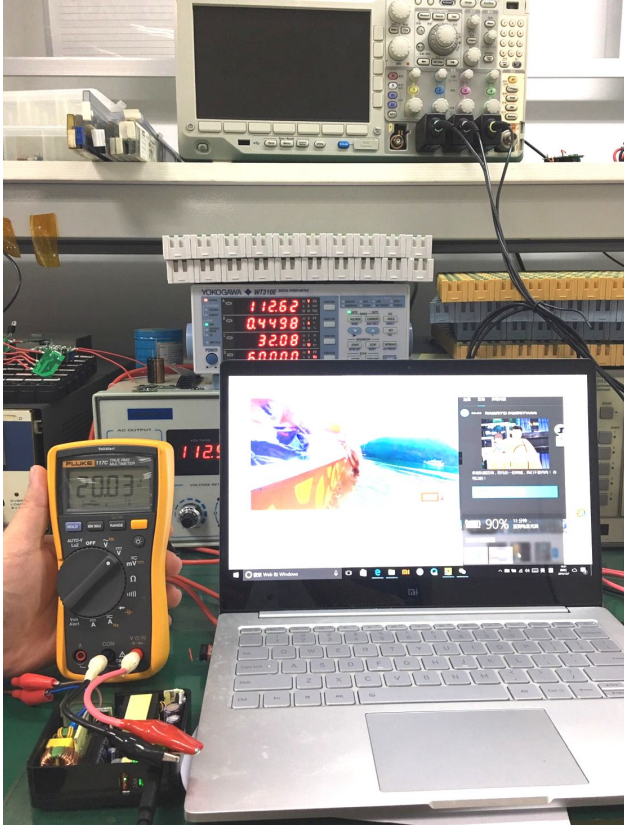


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### 小米 Air 筆電(筆記本) 實機充電測試



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### 小米 手機 五 實機充電測試



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