


REV.	Description	Date
00	SPEC ISSUE (NEW MODEL) ADP-400GR AAA	05/27'22
01	102A-229084 Add Model : ADP-400GR AAB, ADP-400GR AAC	09/16'22
02	102A-22B236 1. Change Item 10-5. Power noise (Condition & Specification)	12/01'22
03	102A-22C035 Add Model : ADP-400GR AAD	12/12'22
04	102A-22C108 1. UPDATE ITEM 11.2 SHOCK SPEC	12/20'22
05	102A-231044 1. UPDATE ITEM 11.2 SHOCK SPEC	01/10'23
06	102A-22C106 Add Model : ADP-400GR AA	01/18'23
07	102A-232105 Add Model : ADP-400GR AAE, ADP-400GR AAF	02/15'23
08	102A-235049 Add Model : ADP-400GR AB, ADP-400GR ABA, ADP-400GR ABB, ADP-400GR ABC	05/05'23
09	102A-235308 1. CR-BOX (L-G/N-G) surge criteria change from 6KV to 8KV (no function error, no latch off, no damage) ; 8KV to 10KV (can damage, no quality accident.)	05/31'23
10	102A-238047 Add Model : ADP-400GR AB88	08/04'23
11	102A-244108 1. ITEM 9.3 重量變更由 "525" 變更為 "490g+/-10g"	04/11'24
12	102A-244263 Add Model : ADP-400GR AC	04/23'24

 台達電子工業股份有限公司 DELTA ELECTRONICS, INC.				DESCRIPTION : 電氣規格 (Electrical Specification)	
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MODEL LIST

ADP-400GR AA	ADP-400GR AAA	ADP-400GR AAB	ADP-400GR AAC	ADP-400GR AAD
ADP-400GR AAE	ADP-400GR AAF	ADP-400GR AB	ADP-400GR ABA	ADP-400GR ABB
ADP-400GR ABC	ADP-400GR AB88	ADP-400GR AC		

1.Scope

This specification applies to the switching regulator used for Class II type products.

2.Specification

Refer to the following

3.Applicable Standard

3-1. Safety specifications

International	IEC 60950-1:2005 +A1:2009 + A2:2013
	IEC 62368-1:2014 (Second Edition)
	IEC 62368-1:2018 (Third Edition)
United States	UL 62368-1, 2 nd Ed, 2014-12-01
	UL 62368-1, 3 rd Ed, 2019-12-13
Canada	CAN/CSA C22.2 No.62368-1-14, 2 nd Ed
	CAN/CSA C22.2 No.62368-1-19, 3 rd Ed
Europe	EN 62368-1:2014 (Second Edition) + A11:2017
	EN 62368-1:2020 (Third Edition) + A11:2020
Korea	K60950-1 (2011-12)
China	CQC GB4943.1-2011 (Safety)

3-2. EMC

EMC	Item	Specifications and Test Conditions
EMI	Conduction (雜音端子電壓)	VCCI-B, FCC Part15 B EN55032, KS C 9832:2019, CISPR32, CISPR35
	Radiation (不要輻射)	VCCI-B, FCC Part15 B EN55032, KS C 9832:2019, CISPR32, CISPR35
	Harmonic (電源高調波)	EN 61000-3-2



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	Flicker (電源閃爍)	EN 61000-3-3
EMS	Electrostatic Discharge (靜電氣放電)	IEC61000-4-2 Test Probe: 150pF / 330 ohm Air : ~ +/- 8kV Contact : ~ +/-6kV No function error, no latch off, no damage.
	RS (放射無線周波數磁界)	IEC61000-4-3 3V/m AM modulation 1kHz 80% 80~10000MHz Sweep rate: 1.5x10-3 decade/s No function error, no latch off, no damage.
	EFT/B (快速暫態雜訊)	IEC61000-4-4 1KV No function error, no latch off, no damage.
	Surge (雷擊)	IEC61000-4-5 Common : +/-4KV Normal : +/-2KV Phase + : 0°C, 90°C Phase - : 180°C, 270°C No function error, no latch off, no damage.
	CS (傳導性妨害)	IEC61000-4-6 3V AM modulation 1kHz 80% 0.15~80MHz Sweep rate: 1.5x10-3 decade/s No function error, no latch off, no damage.



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	Immunity (電源周波數磁界)	IEC61000-4-8 1A/m x,y,z direction No function error, no latch off, no damage.	
	AC dip (電源電壓變動)	IEC61000-4-11 Above 95%, reduction,0.5 cycle (240Vac→12Vac) & (100Vac→5Vac) 30% reduction, 25 cycle (240Vac → 168Vac) & (100Vac→ 70Vac) Above 95%, reduction,250 cycle (240Vac→ 12Vac)&(100Vac→5Vac) No function error, no latch off, no damage. (Performance Criterion B) After the test, AC OFF then ON , then unit should be able to start again and no function error, no latch, no damage. (Performance Criterion C) After that test, AC OFF then ON , then unit should be able to start again and no function error, no latch off, no damage.(Performance Criterion C).	

4. Input characteristics

	Item	Condition		Specification
1	Rated input voltage	-		100 ~ 240 Vac
2	Input voltage range	-		85 ~ 276 Vac
3	Input current	12V/31A @ 100Vac		Less than 4.5A
4	Rated input frequency	-		50Hz / 60Hz
5	Input frequency	-		47 ~ 63 Hz
6	Input inrush current	85 ~ 276 Vac Rated load (Test with 3KV AC source).	Ta= 25°C Cold start	Less than 140A
			Ta= 40°C Repeat AC ON<=>OFF 12V 0A	Less than 180A/2msec 以下

Safety certification

100-127V~4.5A

200-240V~2.3A



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5. Output characteristics

5-1. Output System:

5-2 Output Characteristics:

Below output capacitance (smallest capacity) should be satisfied

12V : 22uF (Ceramic capacitor)

Output	Output Voltage		Output Current			Ripple & Nioise (at rated load)
	Rated	Tolerance	Peak	Rated	Min.	Ta= -5~40°C
12V	12V	+ 5%, - 4%	50.25A/30msec	31A	0A	150mVp-p,max

Output	OCF	OVP
12V	50.25 ~ 62.8A	15.6V,max

Power ON/OFF (Sequence and Timing)

Item	Condition	Specification
t_on	AC ON to 12V turn on time	output voltage can be regulated to 12V+5%, -4% within 2S.
t_off	12V output voltage from 100% to 10%.	12V output voltage from 100% to 10%.
t_r	0V to 12V rise time	12V output voltage from 5% to 95% within 2~20msec.
t_dur 1	Rate input Load : 20A or less	Hold up time. Output voltage should keep in range of rated voltage more than 30ms.
t_9V_keep	After then AC OFF ,12V during hold up time(t_dur 1). And then 12V output voltage is set to 9V. When load is more than 200(mA). When load is less than 1A in 9V output mode. PSU should keep output	9V keeping time while 12V output voltage is set to 9V output mode after AC OFF.



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	<p>for 1s or more. And if PSU is able to work normally by using internal remaining power, output should keep 9[V] (+5%/-4%) as long as possible. . Undershoot voltage should not be less than 7[V] in output mode change situation between 12V mode and 9V mode.</p>	
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6. Other characteristics:

	Item	Condition and Specification	
1	Over / Undershoot	Input range: 85 ~ 276 Vac Output voltage should be within 10% of rated output voltage.	
2	Start with capacitive load	Input range: 85 ~ 276 Vac Output should be in parallel with below capacitor : 12V : 12000uF The unit should be able to start stably.	
3	Protective function	OCP OVP OTP Protection functional operation (Signal and power output)	The 12V has been detected abnormal (12V OC/OV/OT/UV), 12V output should be shut down immediately.
4	Recovery from protection	Remove latch function after the AC OFF and within 3 minutes.	
5	Transient response	12V Input range: 85 ~ 276 Vac [12V load change] Change range : 100~40[%], 90~30[%], 80~20[%], 70~10[%] of rated current Change frequency : 10[Hz]~20[kHz]. Change rate : 1.0A/use	Output voltage should be regulated within 12V +5% -4%.
6.	Operating load range under natural air cooling	Load Condition: 7[A] or less under 25°C / 4.5[A] or less under 40°C Required Performance: Must operate normally without OTP. Not exceed parts temperature rating. No abnormal interference to "end-product" operation. If necessary, set appropriate temperature de-rating which decided to satisfy the above criterion after mutual agreement.	



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7. Common specifications

	Item		Condition	Specification
1	Switching frequency		100Vac input. Rated load.	-
2	Power factor		-	IEC61000-3-2.
3	Life		Rated input voltage. Ambient temperature, constant humidity.	70,000Hr or more with thermal test BOX. => 20,000Hr, 12V rated load (FAN cooling). => 50,000Hr, 12V 3A (w/o Fan).
4.	Efficiency	Light load w/o Fan	Rated input voltage, load (0A).	<0.17W
			Rated input voltage, load (0.01A).	37.8
			Rated input voltage, load (0.025A).	61.5
			Rated input voltage, load (0.05A).	66.4
			Rated input voltage, load (0.1A).	72.4
			Rated input voltage, load (0.2A).	76.7
			Rated input voltage, load (0.3A).	82.0
			Rated input voltage, load (0.4A).	83.0
			Rated input voltage, load (0.6A).	84.0
			Rated input voltage, load (1A).	85.0
		Normal load With Fan	Rated input voltage, load (10A).	89.0
			Rated input voltage, load (20A).	88.0
			Rated input voltage, load (31A).	85.5
5	Parts temperature		Rated input voltage. Thermal test BOX. Ta=40°C	There is enough de-rating of temperature for all component. No component over derating before OTP trigger.
6	Hold up time (瞬停保証時間)	t_dur1	Rated input voltage 12V: 20A	50Hz 1.5 cycle (=30ms). Output voltage shall be satisfy electric characteristic.
7.	Leakage current		Normal temp and humidity Rated input	100uA or less



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8	Input discharge time	Input 121V or less, from AC power OFF to 37% rated.	1 sec or less.
		Input 122V or more, from AC power OFF to 45V.	1 sec or less.
9	入力片切 test	AC ON→ Line OPEN→Line SHORT. AC ON→Neutral OPEN→Neutral SHORT.	Same as AC ON→ AC OFF→ AC ON Same as AC ON→ AC OFF→ AC ON
10	Overvoltage apply test	400Vac input / 2sec.	No safety hazard.
11	Dielectric strength	Input between primary and secondary.	IEC60950-1 item 5.2
		QA (sampling) : 3.0kVac 50/60Hz 60sec Production line (all): 3.1kVac 50/60Hz 3sec	Sense current : 10mA or less. Without damage to parts.
12	Insulation resistance	500 Vdc input between primary and secondary.	10 Mohm or more.
13	Insulation distance	-	Should be met the safety requirement and add external 0.5mm for SIE request.

8. Environmental

	Item	Condition & Specification
1	Operation temperature and humidity range	-5 ~ +40°C (humidity 20~90% Rh)
2	Storage temperature and humidity range	-40 ~ +80°C (humidity 10~90% Rh)
3	High humidity operation	Treatment : Storage for preprocessing before Hi temperature operation +35°C/90% Rh Duration 8h Electric characteristic shall be satisfied.
4	Low temperature operation	Treatment : Storage for preprocessing before Low temperature operation -5°C Duration 8hr Electric characteristic shall be satisfied.
5	Continuous operation under high temperature and high humidity	Condition of continuous operation +40°C/90% Rh 1000Hr operation. Electric characteristic shall be satisfied.
6.	Continuous operation under room temperature and room humidity	Condition of continuous operation +25°C/30% Rh Duration 48h Electric characteristic shall be satisfied.



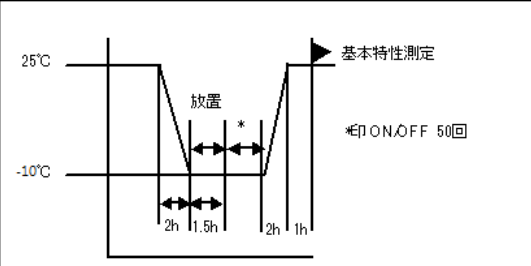
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7.	Continuous operation under low temperature	Condition of continuous operation -10°C Duration 48hr Electric characteristic shall be satisfied.
8	Continuous operation under low humidity	Condition of continuous operation +20°C/20% Rh Duration 48hr Electric characteristic shall be satisfied.
9	Low temperature ON/OFF	Rated input voltage \pm 10%. Rated load. Electric characteristic shall be satisfied. Testing follow below temperature curve: 
10	High temperature and high humidity storage	After put the unit with max. storage +80°C/90% Rh , duration 100Hr, then change the condition to ambient temperature & humidity 1Hr, and then test it. Electric characteristic shall be satisfied.
11	Low temperature storage	After put the unit with min. storage -40°C, duration 100Hr,, then change the condition to ambient temperature 1Hr, and then test it. Electric characteristic shall be satisfied.
12.	Humidity resistance	Treatment 1 : High temperature and high humidity storage Temperature: 40 \pm 2°C Humidity 90~95% Duration: 48 hour Treatment 2 : Standard atmospheric storage Wipe moisture after treatment 1 , and then storage at the following condition Temperature / Humidity : Room temperature and normal humidity. Duration : 30min Criteria after the above test : Dielectric strength and insulation resistance must be satisfied.
13	Thermal shock	Treatment : thermal shock (non-operation storage) -40°C~80°C / 100(Cyc) Electric characteristic shall be satisfied and without distinct damage in appearance.



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14	Heat cycle	<p>Treatment : thermal shock (non-operation storage) -40°C~80°C / 90 % RH Electric characteristic shall be satisfied and without distinct damage in appearance.</p>



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9. Other

	Item	Condition & Specification
1	Appearance	There is no adhesion of the foreign material and the dirty fingerprint. In addition, when producing it depends on the oil and the like which is used, there is no stench of the product.
2	Adhesive	Chloroprene is designated as the main component, do not use the adhesive.
3	Mass	490g+/-10g
4	Noise	-

10. 耐久性能

	Item	Condition & Specification
1	Output open / short	12V Rated input voltage. After output short 1sec, AC off (disable latch mode) then re-start as 1cycle, this 100 cycles after doing electric characteristic shall be satisfied. (將輸出端子 Short 一秒後, AC OFF (Latch 解除) 再切入 AC 以此為 1cycle, 實行 100 cycle 後, 滿足電器特性。)
2	Power ON/OFF (Secondary)	Rated input voltage +/-10%. 12V: Rated load (resistor) Inside thermal test BOX, FAN cooling The secondary ACDC, STBY control the ON/OFF shall be done 100,000 times. (5sec/ON, 5sec/OFF) Electric characteristic shall be satisfied.
3	O/S test	Input voltage : 90V & 264V Output load : Rated load. Open & Short parts: Transistor and IC: Combination between all terminals Diode: Between A-K Transformer & chock: Coil Capacitance: Between terminals When AC input turn on state, to do components open/short test. No ignition or smoke or damage.
4	Electrostatic Discharge	IEC61000-4-2 Rated input voltage. Rated load. Test probe: 150pF / 330 ohm. Each 5 times. Discharge location: [Air] Air : +/- 12KV: no function error. +/- 14KV: no latch off, no damage. +/- 15KV: no quality accident.



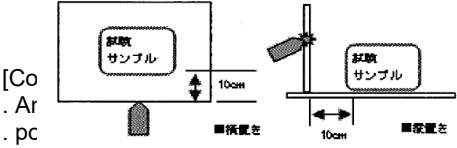
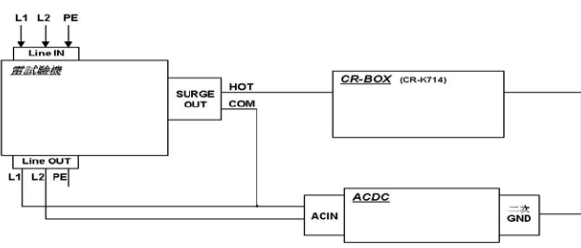
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		<p>. Any surface hand can touch except the air intake vent. [Indirect]</p> 	<p>Indirect : +/- 8KV: no function error, no latch off, no damage. +/- 15KV: no quality accident.</p> <p>Contact : +/- 12KV: no function error, no latch off, no damage. +/- 15KV: no quality accident.</p>
5	Power noise	<p>Rated input voltage, rated load. Noise frequency : 30~100Hz Noise level : $\pm 200[V] \sim 1[kV]$ (200[V] step) Pulse width : 100[nsec] and 1000[nsec] Input mode : Normal mode for Live and Normal mode for Neutral Input duration : 1[min] or more (for each voltage condition)</p>	No function error, no latch off, no damage.
6	Lighting surge 雷撃	<p>Rated input voltage, rated load. IEC1000-4-5 with CR box (13 ohm + 9uF) Phase +: 0°, 90°. Phase -: 180°, 270°. Each 5 times.</p> 	<p>L-N/N-L +/- 6KV: no function error, no latch off, no damage. +/- 8KV: cam damage, no quality accident.</p> <p>L-G/N-G +/- 8KV: no function error, no latch off, no damage. +/- 10KV: can damage, no quality accident.</p>

11. MECHANICAL

Item	Judgement	Condition
1 Vibration (1)	Electric characteristic shall be satisfied. And no remarkable abnormal occurrence on the appearance and construction. Parts and assembly with customer system must also be satisfied.	<p>Non-operating/Random:</p> <p>The entire frequency range from 7Hz(0.822 g^2 /Hz) to 30Hz(0.192 g^2 /Hz) and return to 7Hz(0.822 g^2 /Hz) shall be a transverse in 5 min. Three axis (X,Y,Z direction) shall be applied 20minutes acceleration: 23.5 m/s² (2.85Grms)</p>



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	Vibration (2)	判定基準： 1. 沒有異音（於測試過程 or 測試後，不可有測試設備以外的異音） 2. 電氣特性要滿足。外觀與構造沒有明顯異常	振動數：50Hz ~ 130Hz 加速度：2 [m/s^2] 振動 Type：Sweep 方向&時間：X,Y,Z 10 分間																																																
2	Shock	Electric characteristic shall be satisfied. And no remarkable abnormal occurrence on the appearance and construction. Parts and assembly with customer system must also be satisfied.	1.Non-operating/half-sine Three axis (X,Y,Z direction) shall be applied in both directions of mutually perpendicular axis 1 times (a total of 6 times) for table a. Sample : 1pcs <table><tr><th colspan="3">累積保証</th></tr><tr><th>落下面</th><th>G</th><th>Duration</th></tr><tr><td>1 面</td><td>250</td><td>5</td></tr><tr><td>2 面</td><td>250</td><td>5</td></tr><tr><td>3 面</td><td>250</td><td>5</td></tr><tr><td>4 面</td><td>250</td><td>5</td></tr><tr><td>5 面</td><td>250</td><td>5</td></tr><tr><td>6 面</td><td>250</td><td>5</td></tr></table> 2.Non-operating/half-sine A directions for a sample, G & Duration value follow table b Total sample : 6pcs <table><tr><th colspan="3">單面保証</th></tr><tr><th>落下面</th><th>G</th><th>Duration</th></tr><tr><td>1 面</td><td>500</td><td>2</td></tr><tr><td>2 面</td><td>500</td><td>2</td></tr><tr><td>3 面</td><td>650</td><td>2</td></tr><tr><td>4 面</td><td>400</td><td>2.5</td></tr><tr><td>5 面</td><td>650</td><td>2</td></tr><tr><td>6 面</td><td>500</td><td>2</td></tr></table>	累積保証			落下面	G	Duration	1 面	250	5	2 面	250	5	3 面	250	5	4 面	250	5	5 面	250	5	6 面	250	5	單面保証			落下面	G	Duration	1 面	500	2	2 面	500	2	3 面	650	2	4 面	400	2.5	5 面	650	2	6 面	500	2
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 台達電子工業股份有限公司 DELTA ELECTRONICS, INC.				DESCRIPTION : 電氣規格 (Electrical Specification)	
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Date	Drawn	Design (EE)	Design (ME)	DOCUMENT NAME. :	REV.
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			<p>面 定義</p>
3	Drop I	1. No component broken.. 2. No PWB copper pad peeling and broken 3. Hi-pot test pass with specific condition. (AC 3300V/1min) 4. No soldering crack. 6. ATS function Pass.	測試前,Case 請用螺絲鎖附在系統配合孔固定 case 1.Drop TIMES: 5 times for every surface (six side),total 30 times 2. Test surface material : The concrete 3.Drop height: 10cm.
4	Drop II	1. No component broken.. 2. No PWB copper pad peeling and broken 3. Hi-pot test pass with specific condition. (AC 3300V/1min) 4. No soldering crack. 5. ATS function Pass.	測試前,Case 請用螺絲鎖附在系統配合孔固定 case 1.Drop TIMES: 1 times for every surface (six side),total 6 times 2. Test surface material : The concrete 3.Drop height: 45cm.

12. Packing test :

12.1 Drop test condition:

<1>.Drop height:**80.0CM**

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<2>.Impact surface: concrete floor

<3>.Drop times: **1 side (Bottom side),total 10 times**

Criteria:

The sample has no electric characteristic issue and without distinct damage in appearance.

12.2 Vibration test condition:

<1>.Wave: Random

<2>.Acceleration: 1.146Grms

<3>.Frequency: 5-200Hz

<4>.Duration:30min/side

<5>.Orientations: each axis total 3 times

Criteria:

The sample has no electric characteristic issue and without distinct damage in appearance.

12.3 Pallet Test

<1>. Container (Truck) Shipping test

a) Test Distance: Manufacturing factory to ODM including return distance

b) Test Item: Full packaged pallet

c) Criteria: 1) PSU No Damage 2) Shipping material can't have structural damage. Minor damage is accepted. 3) No any dust, ash or condensation water inside tray or PSU.


<2>. Sea Transportation Test

a) Test Distance: Manufacturing factory to TW DEIC with sea transportation

b) Test Item: Full packaged pallet

c) Criteria: 1) PSU No Damage 2) Shipping material can't have structural damage. Minor damage is accepted. 3) No any dust, ash or condensation water inside tray or PSU.

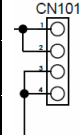
13. For safety

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13.1 Altitude : 2000m

13.2 Thermal test setup

14. CN101

Pin_1	Output (+)	
Pin_2	Output (+)	
Pin_3	Output (-)	
Pin_4	Output (-)	

15. CFM: Burn-in air flow 8.3CFM(流經電源內部)

Product Ingress protection(IP) rating: Not requirement

Product Application: Game Consoles

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