

設計驗證
工程課
2024-08-26
發行
鈺泰科技開發股份有限公司

承　認　書

APPROVAL　SHEET

客　戶	鈺緯科技開發股份有限公司
CUSTOMER	DIVA Laboratories, Ltd.

零 件 編 號 TYPE NO	包裝 / 品牌 PACKAGE / BRAND
AP6P250N	Brand : APES
3BAP6P2501Y(B0138)	Package :SOT-23S
	Tape&Reel: 3000pcs/Reel

REMARK

設計驗證
工程課
2024 -08- 26
發行
鈺緯科技開發股份有限公司

Sentronic International Corp.
昱捷
TEL:
8797-5025
新北市汐止區新台五路一段93號25樓之6

APPROVE		COMMENT ：
REJECT		

ACCEPTED BY Willy　　DATE :2024/8/26

昱捷股份有限公司　　新北市汐止區新台五路一段93號25樓之6

SENTRONIC INTERNATIONAL CORP.　　TEL : 02-8797-5025　FAX :2659-2979

富鼎先進電子股份有限公司
ADVANCED POWER ELECTRONICS CORP.

Address: 12F-1&2, No.5, Taiyuan 1 ST., Zhubei City, Hsinchu County 30265, Taiwan,
R.O.C.Tel:886-3-6215899 Fax:886-3-6215999
E-mail:mail@a-power.com.tw

承 認 書

Specification Sheet

Customer：昱捷股份有限公司

Customer Part Number	AP6P250N 3BAP6P2501Y(B0138)
APEC Part Number	AP6P250N
Issued Date	2019/04/03
SPEC No.	SPEC-201904-0003

設計驗證
工程課
2024 -08- 26
發行
昱鐘科技開發股份有限公司

APEC Approved		
		批准 2019.04.03 DCC
Sales Manager	**Sales**	**QA**

Customer Approved			
Dept.			
Signature			

APEC DCC

Item	Contents	Page
1	Data Sheet	p1~p6
2	Package Outline	p7~p8
3	Packing Standard	p9~p17
4	Material List	p18~p19
5	IR Reflow	p20
6	Reliability Test Report	AnnexIp1~p7

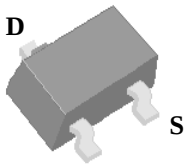
AP6P250N

Halogen-Free Product

Advanced Power Electronics Corp.

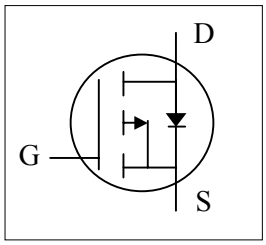
P-CHANNEL ENHANCEMENT MODE POWER MOSFET

- ▼ **Simple Drive Requirement**
- ▼ **Small Package Outline**
- ▼ **Surface Mount Device**
- ▼ **RoHS Compliant & Halogen-Free**



SOT-23S

BV_{DSS}	-60V
$R_{DS(ON)}$	250mΩ
I_D	-1.6A



Description

AP6P250N series are from Advanced Power innovated design and silicon process technology to achieve the lowest possible on-resistance and fast switching performance. It provides the designer with an extreme efficient device for use in a wide range of power applications.

The SOT-23S package is widely preferred for commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters.

Absolute Maximum Ratings@T_j=25°C(unless otherwise specified)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-60	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_A=25℃	Drain Current, V_{GS} @ 10V[3]	-1.6	A
I_D@T_A=70℃	Drain Current, V_{GS} @ 10V[3]	-1.3	A
I_{DM}	Pulsed Drain Current[1]	-10	A
P_D@T_A=25℃	Total Power Dissipation	1.25	W
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Data

Symbol	Parameter	Value	Unit
Rthj-a	Maximum Thermal Resistance, Junction-ambient[3]	100	℃/W

Electrical Characteristics@T_j=25°C(unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=-250uA	-60	-	-	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=-10V, I_D=-1.6A	-	-	250	mΩ
		V_{GS}=-4.5V, I_D=-1A	-	-	300	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=-250uA	-1	-	-3	V
g_{fs}	Forward Transconductance	V_{DS}=-10V, I_D=-1A	-	3.8	-	S
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-48V, V_{GS}=0V	-	-	-25	uA
I_{GSS}	Gate-Source Leakage	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
Q_g	Total Gate Charge	I_D=-1A	-	5	8	nC
Q_{gs}	Gate-Source Charge	V_{DS}=-48V	-	1.5	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	V_{GS}=-4.5V	-	1.8	-	nC
$t_{d(on)}$	Turn-on Delay Time	V_{DS}=-30V	-	8	-	ns
t_r	Rise Time	I_D=-1A	-	5	-	ns
$t_{d(off)}$	Turn-off Delay Time	R_G=3.3Ω	-	17	-	ns
t_f	Fall Time	V_{GS}=-10V	-	3	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V	-	450	720	pF
C_{oss}	Output Capacitance	V_{DS}=-25V	-	37	-	pF
C_{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	28	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage[2]	I_S=-1A, V_{GS}=0V	-	-	-1.3	V
t_{rr}	Reverse Recovery Time	I_S=-1A, V_{GS}=0V,	-	17	-	ns
Q_{rr}	Reverse Recovery Charge	dI/dt=100A/μs	-	9	-	nC

Notes:

1.Pulse width limited by Max. junction temperature.

2.Pulse test

3.Surface mounted on 1 in^2 copper pad of FR4 board, t ≤10sec ; 300 ℃/W when mounted on Min. copper pad.

THIS PRODUCT IS SENSITIVE TO ELECTROSTATIC DISCHARGE, PLEASE HANDLE WITH CAUTION.
USE OF THIS PRODUCT AS A CRITICAL COMPONENT IN LIFE SUPPORT OR OTHER SIMILAR SYSTEMS IS NOT AUTHORIZED.
APEC DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.
APEC RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN.

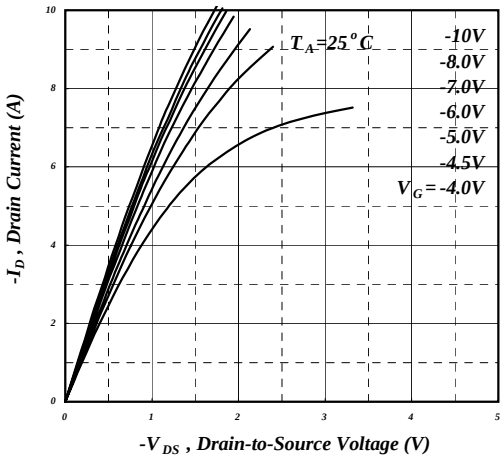


Fig 1. Typical Output Characteristics

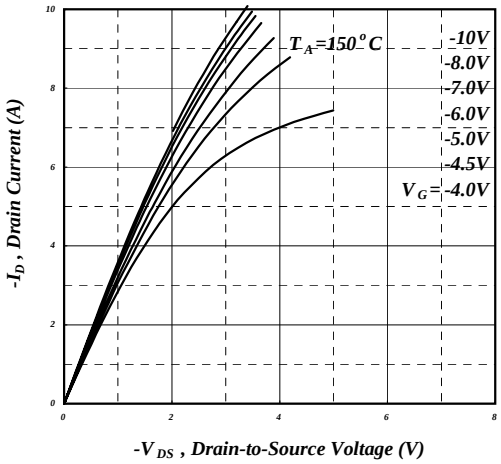


Fig 2. Typical Output Characteristics

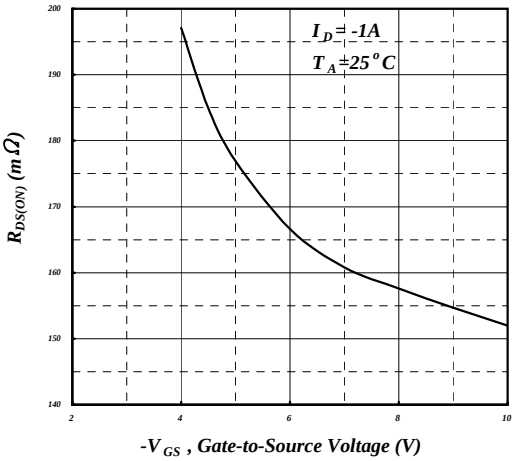


Fig 3. On-Resistance v.s. Gate Voltage

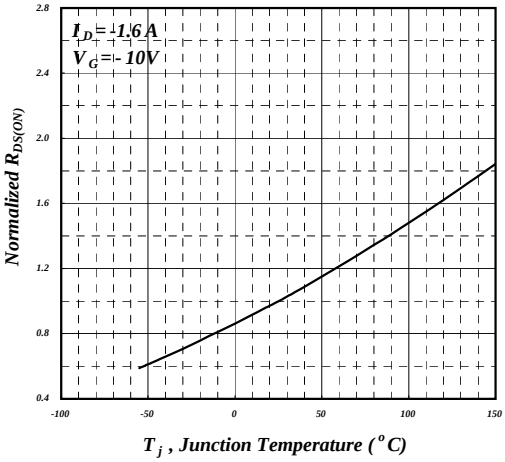


Fig 4. Normalized On-Resistance v.s. Junction Temperature

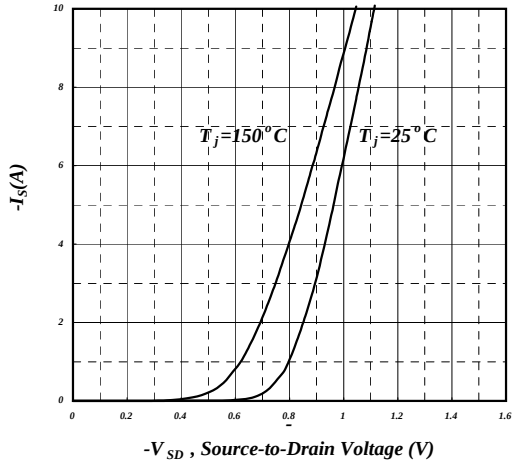


Fig 5. Forward Characteristic of Reverse Diode

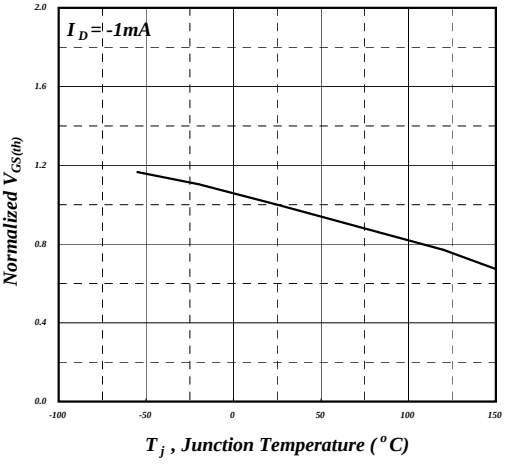


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

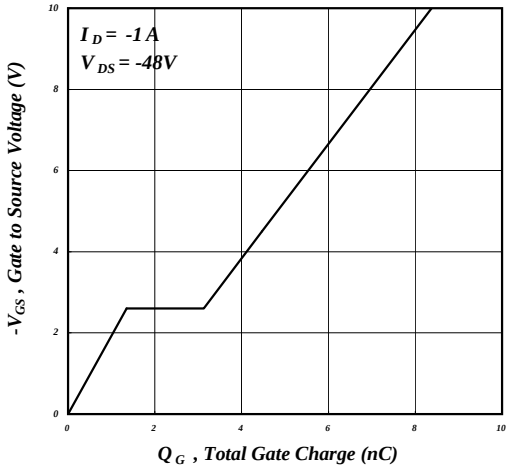


Fig 7. Gate Charge Characteristics

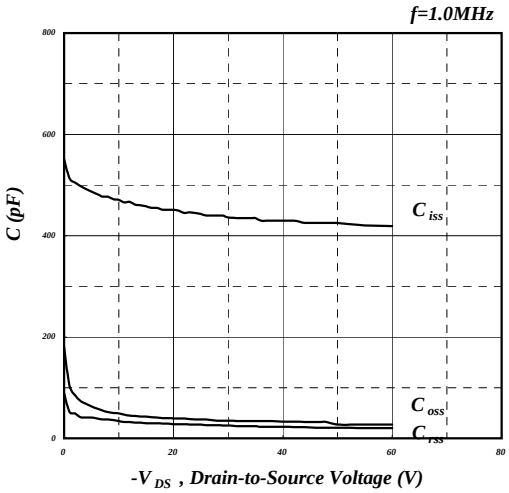


Fig 8. Typical Capacitance Characteristics

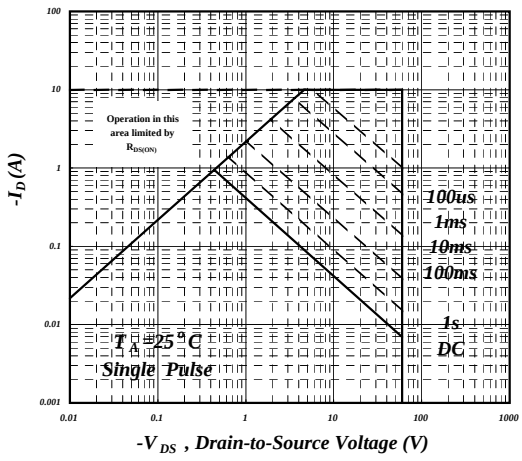


Fig 9. Maximum Safe Operating Area

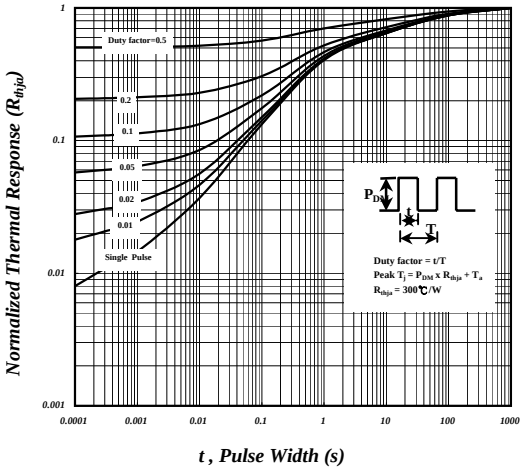


Fig 10. Effective Transient Thermal Impedance

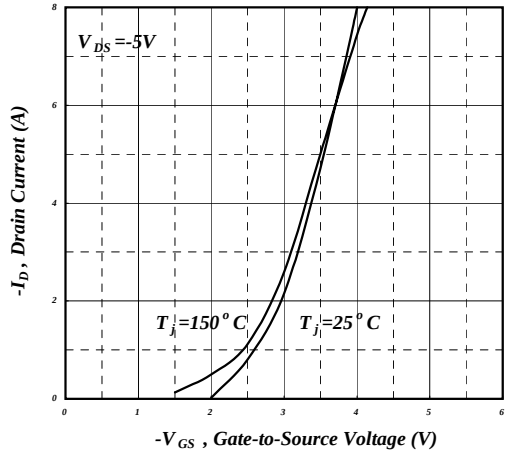


Fig 11. Transfer Characteristics

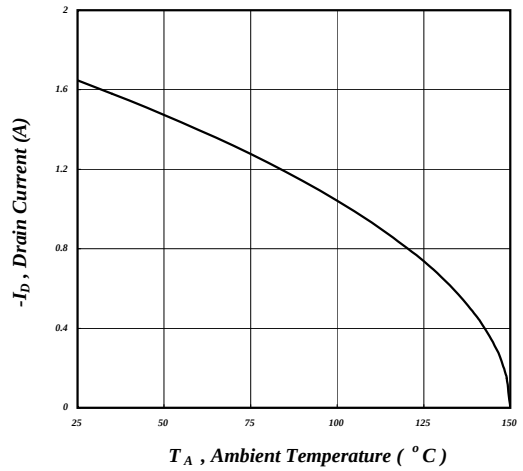


Fig 12. Drain Current v.s. Ambient Temperature

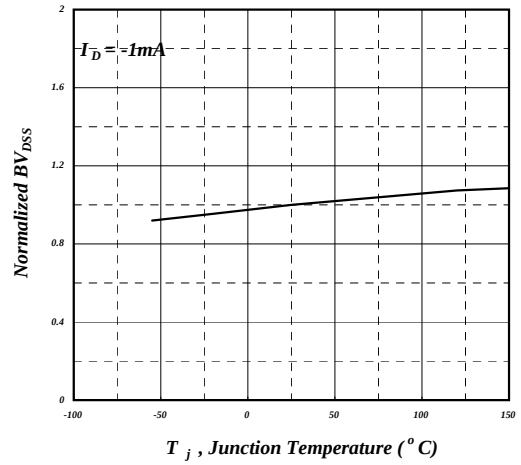


Fig 13. Normalized BV_{DSS} v.s. Junction Temperature

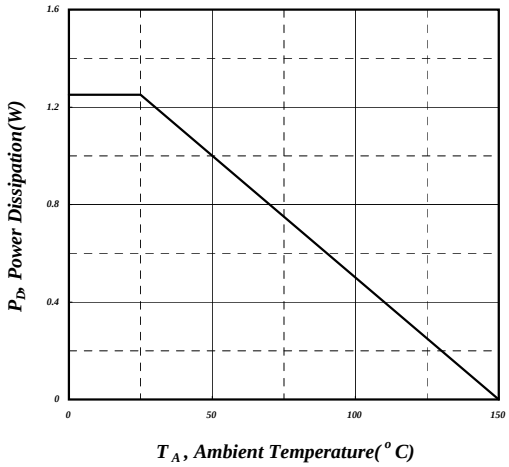


Fig 14. Total Power Dissipation

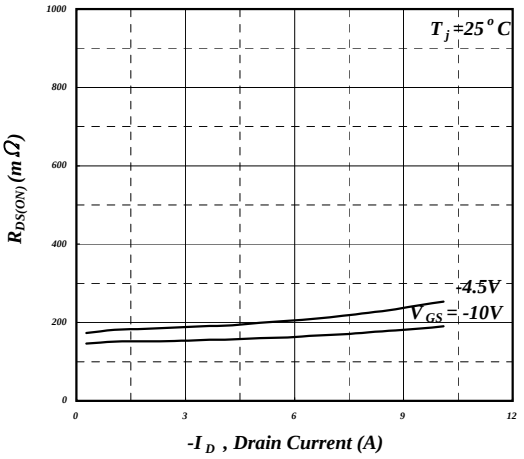
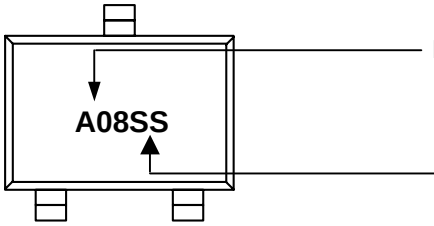


Fig 15. Typ. Drain-Source on State Resistance

MARKING INFORMATION



Part Number : A08

Date Code : SS

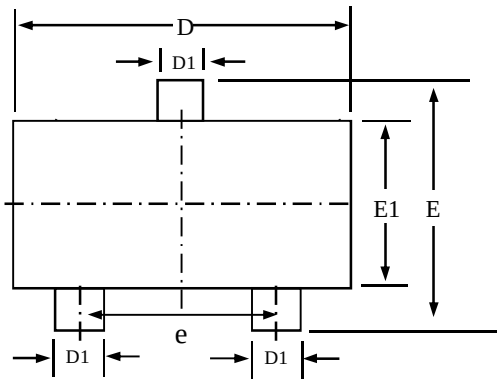
SS:2004,2008,2012,2016,2020...

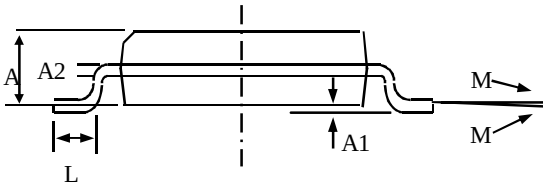
SS:2003,2007,2011,2015,2019...

SS:2002,2006,2010,2014,2018...

SS:2001,2005,2009,2013,2017...

Package Outline : SOT-23S





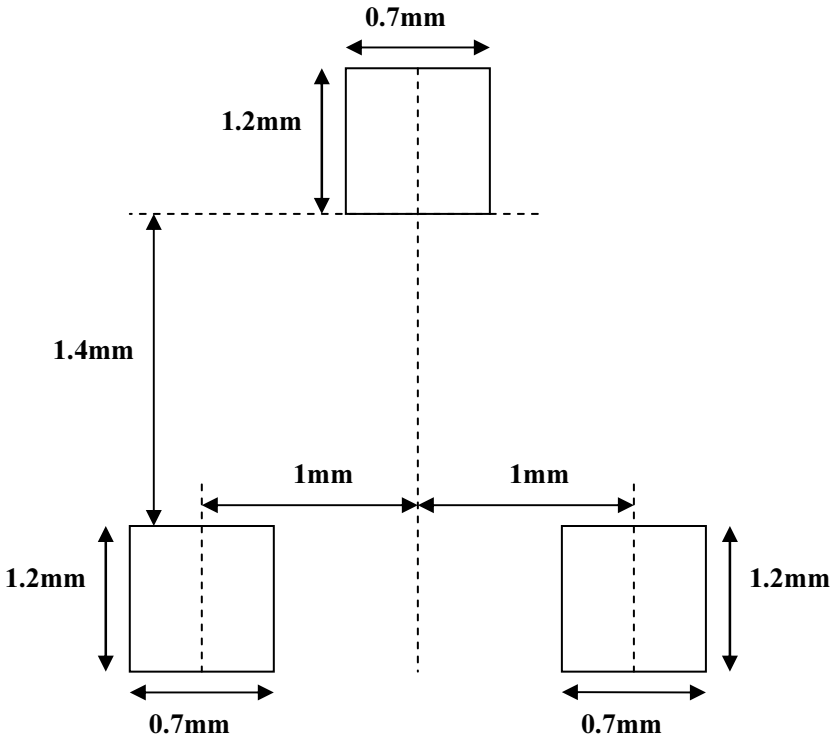
SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	0.80	1.00	1.20
A1	0.00	—	0.10
A2	0.05	—	0.20
D1	0.30	0.40	0.50
e	1.80	1.90	2.00
D	2.80	2.90	3.10
E	2.10	2.40	2.70
E1	1.20	1.30	1.40
M	0°	5°	10°
L	0.20	—	0.60

1.All Dimension Are In Millimeters.

2.Dimension Does Not Include Mold Protrusions.

Draw No. M1-N3S-G-v03

SOT-23S FOOTPRINT：



富鼎先進電子股份有限公司

包裝規範 Packing Spec

WAFER BOX ONTO CARTON. AS ATTACHMENT 十一-3)

5.2 PACKAGE 產品包裝作業規定(5.2 PACKAGED FG PACKING STANDARD.)

5.2.1 管條(TUBE)之裝箱法(5.2.1 TUBE PACKING STANDARD.)

5.2.1.1

PKG TYPE	TO-220	TO-220CFM TO-126F	TO-262	DIP-8	TO-3P	TO-251 TO-251ST	TO-247
TUBE	50ea	50ea	50ea	50ea	30ea	80ea	30ea
INNER BOX	1000ea/Box	1000ea/Box	1000ea/Box	3000ea/Box	360ea/Box	8000ea/Box	240ea/Box
OUTER CORTON	6000ea/carton	6000ea/carton	6000ea/carton	12000ea/carton	1440ea/carton	40000ea/carton	1200ea/carton
CARTON DIMENSION	Attachment (一)	Attachment(一) Attachment (一-1)	Attachment (一)	Attachment (五)	Attachment (七)	Attachment(四)	Attachment (十二)

5.2.1.2 單一 INNER BOX 只允許二個不同 DATA CODE 併管。

(5.2.1.2 Only allow 2 different date code to be combined into one Inner Box.)

5.2.1.3 尾數箱裝箱時需將剩餘空間，以小內盒或氣泡膠填充之。

(5.2.1.3 NEED TO PUT EMPTY INNER BOX INSIDE OUTER CARTON FOR NON FULL PACKED CARTON.)

5.2.2 捲型包裝(TAPE&REEL)之裝箱法

(5.2.2 TAPE & REEL PECKING STANDARD.)

5.2.2.1

PKG TYPE	TO-252/ SOT-223	TO-263	SOP-Series TSSOP- Series PMPAK/ESOP MESOP- Series DFN 3*3/ DFN 3*3RU QFN3.5*3.5 PDFN 5*6	SOT-23/5/6/ SOT-323/363 SOT-723 SC70-4L/5L/ TSOT-23/5/6 DFN 3*2/ DFN 2*2 WCSP/FDFN	SOT-89	GEM2928-8	TO-92
REEL	3000ea	800ea	3000ea	3000ea	1000ea	3000ea	2000ea
INNER BOX	6000ea/Box	800ea/box	6000ea/box	15000ea/box	4000ea/box	15000ea/box	2000ea/box
OUTER CORTON	24000ea/carton	4000ea/carton	48000ea/carton	150000ea/carton	40000ea/carton	150000ea/box	32000ea/box

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CARTON DIMENSION	Attachment (三)	Attachment (三)	Attachment (三)	Attachment (二)	Attachment (二)	Attachment(二)	Attachment(八)
REEL SPEC.	Figure 一/六	Figure 三	Figure 二/八/十一/十五/十七-十九/二十一/二十二/二十四	Figure 四/十/十二/十三/十四/十六/十七/二十七	Figure 五	Figure 七	Figure 九

5.2.2.2 產品料卷外圍必需要有保護圈或當不滿卷時需用紅色泡棉條填充后再上保護圈，尾數箱裝箱時需將剩餘空間，以小內盒或氣泡膠填充之。

(5.2.2.2 EVERY REEL MUST HAVE A PROTECT BAND OR **IF REEL IS NOT FULL MUST HAVE READ FOAM LINER AND PROTECT BAND**. NEED TO PUT EMPTY IN'NER BOX OUTER CARTON FOR NON FULL PACKED CARTON.)

5.2.2.3 單一料捲只允許二個不同 DATA CODE 併捲。

(5.2.2.3 Only allow 2 different date code to be combined into one reel.)

5.2.3 靜電袋之裝箱法(5.2.3 BAG PACKING STANDARD.)

PKG TYPE	TO-220	TO-251/TO-92
BAG	50ea	100ea
INNER BOX	500ea/box	10000ea/box
OUTER CORTON	4000ea/carton	40000ea/carton
CARTON DIMENSION	Attachment (六)	Attachment (八)

5.2.3.2 尾數箱裝箱時需將剩餘空間，以小內盒氣泡膠填充之。

(5.2.3.2 NEED TO PUT EMPEY INNER BOX INSIDE OUTER CARTON FOR NON FULL PACKED CARTON.)

5.3 不同產品不可裝入同一箱子內，以避免產品混料。

(5.3 NO ANY DIFFERENT P/N FG INSIDE SAME CARTON.)

5.4 包裝箱標籤：整貨裝箱後將型號數量標籤(如附件七)貼在紙箱及小內盒側面。

(5.4 LABELING：ATTACH LABEL ONTO INNER BOX & OUTER CARTON AS ATTAHMENT 七.)

5.5 真空包裝：產品料卷外圍必需要有保護圈或當不滿卷時需用紅色泡棉條填充后再上保護圈，再放入抗靜電鋁箔袋中，同乾燥劑及濕度指示卡一起抽真空後，再置入內盒.

(5.5 VACUUM PACKING:EVERY REEL MUST HAVE A PROTECT BAND OR **IF REEL IS NOT FULL MUST HAVE READ FOAM LINER AND PROTECT BAND** ; VACUUM AND SEAL THE BAG BEFORE PUT ONE REEL TOGETHER WITH DESICCANTS AND HUMIDITY INDICATOR CARD IN THE ESD MOISTURE BARRIER BAG; THEN PUT INTO THE INNER BOX.

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5.5.1.真空包裝之裝箱法：(5.5.1 VACUUM PACKING STANDARD.)

抗靜電鋁箔袋 PKG INCHTYPE	TO-252/ SOT-223	TO-263	SOP-Series TSSOP-Series ESOP-8/PMPAK/ MESOP--Series DFN 3*3 DFN 3*3RU QFN3.5*3.5 PDFN 5*6	SOT-23/5/6/SOT-323/363 SOT-723 SC70-4L/5L/TSOT-23/5/6 DFN 3*2/DFN 2*2 WCSP/FDFN	SOT-89	GEM2928-8
REEL	3000ea	800ea	3000ea	3000ea	1000ea	3000ea
INNER BOX	6000ea/Box	800ea/box	6000ea/box	12000ea/box	3000ea/box	12000ea/box
OUTER CORTON	24000ea/carton	4000ea/carton	48000ea/carton	120000ea/carton	30000ea/carton	120000ea/box
CARTON DIMENSION	Attachment (二)	Attachment (二)	Attachment (三)	Attachment (二)	Attachment (二)	Attachment(二)
REEL SPEC.	*Figure 一/六*	*Figure 三*	*Figure 二/八/十一/十五/十七-十九/二十一/二十二/二十四*	*Figure 四/十/十二/十三/十四/十六/十七/二十七*	*Figure 五*	*Figure 七*

5.5.2. 7 吋料卷如附件(九)

(5.5.2.ATTACHMENT(九)ESD MOISTURE BARRIER BAG FOR 7 INCH REEL.)

5.5.3. 13 吋料卷如附件(十)

(5.5.3.ATTACHMENT(十)ESD MOISTURE BARRIER BAG FOR 13 INCH REEL.)

*以上依客戶需求使用之。*ABOVE ITEM USED BY CUSTOMER REQUIREMENT.

5.5.4 真空包裝 PKG TYPE: (VACUUM PKG TYPE:)

PRODUCT TYPE	PKG TYPE
MOS	SO-8,ESOP-8,SOT-223,WLCSP , DFN SERIES , PDFN SERIES, SOT-723 (PMPAK5*6→ONLY P/N:***CMT)
IC	ALL IC TYPE

5.5.5 若有真空包裝需求不在”5.5.4 真空包裝 pkg Type”之中,APEC 會在工單上備註“真空”或是在出貨前以 E-mail 方式通知“真空”,告知封裝廠作業.

(5.5.5 IF MUST OF VACUUM PACING BUT NOT “5.5.4 VACUUM PKG TYPE”; APEC WILL REMARK “VACUUM” ON WORK SHEET OR BEFORE SHIPPING

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WILL NOTICE “VACUUM” BY E-MAIL TO ASS’Y HOUSE.)

5.6 包裝檢驗：裝箱完成後通知 QA 檢驗，檢驗合格則蓋上檢查合格章後等待出貨。

(5.6 PACKING INSPECTION：STAMP QA IN SPETION ONTO LABEL AFTER COMPLETELY PACKING STEP.)

6.外購成品的包裝規範依客戶要求。

(6. THE PACKING SPEC. OF PURCHASED FG IS FOLLOWED BY CUSTOMER’S REQUIREMENT.)

7. 相關文件：QWMPC-7805

(7. DOCUMENT：QWMPC-7805)

附件七：外箱標籤（ATTACHMENT:CARTON LABEL ）

檢驗合格標章樣式：(STAMP FOR INSPECT BY ACCEPTED)



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包裝規範 Packing Spec

無鉛產品標籤(For Pb Free Product) ：



PO. BEFORE 2014YEAR WW13



PO. AFTER 2014YEAR WW14

標籤資訊要求:
(LABEL REQUIREMENT)
A. 封裝別 Ex. TO-220
(A. PKG TYPE Ex. TO-220)
(B. QC 章
(B. QC STAMP)

條碼說明:
(BAR CODE STANDARD)
〔P/N〕:PART NO.
〔Lot No〕:D/C+YWW
〔Q’ ty〕:數量(QUANTITY)
〔Date code〕:D/C

無鹵產品標籤(For Halogen Free Product) ：



PO. BEFORE 2014YEAR WW13

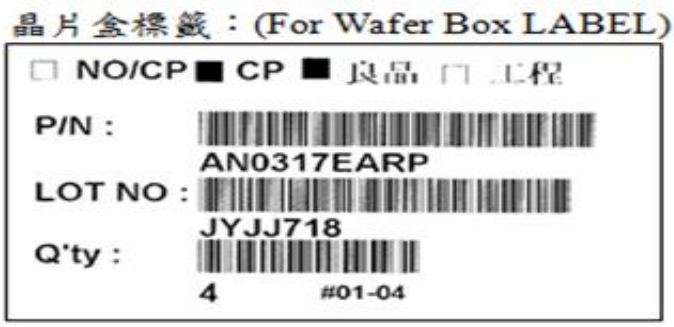


PO. AFTER 2014YEAR WW14

G.P.PASS LABEL 貼於外箱右上角：
(PASTED ON RIGHT CORNEROF THE CARTON)



晶片盒標籤：(For Wafer Box LABEL)

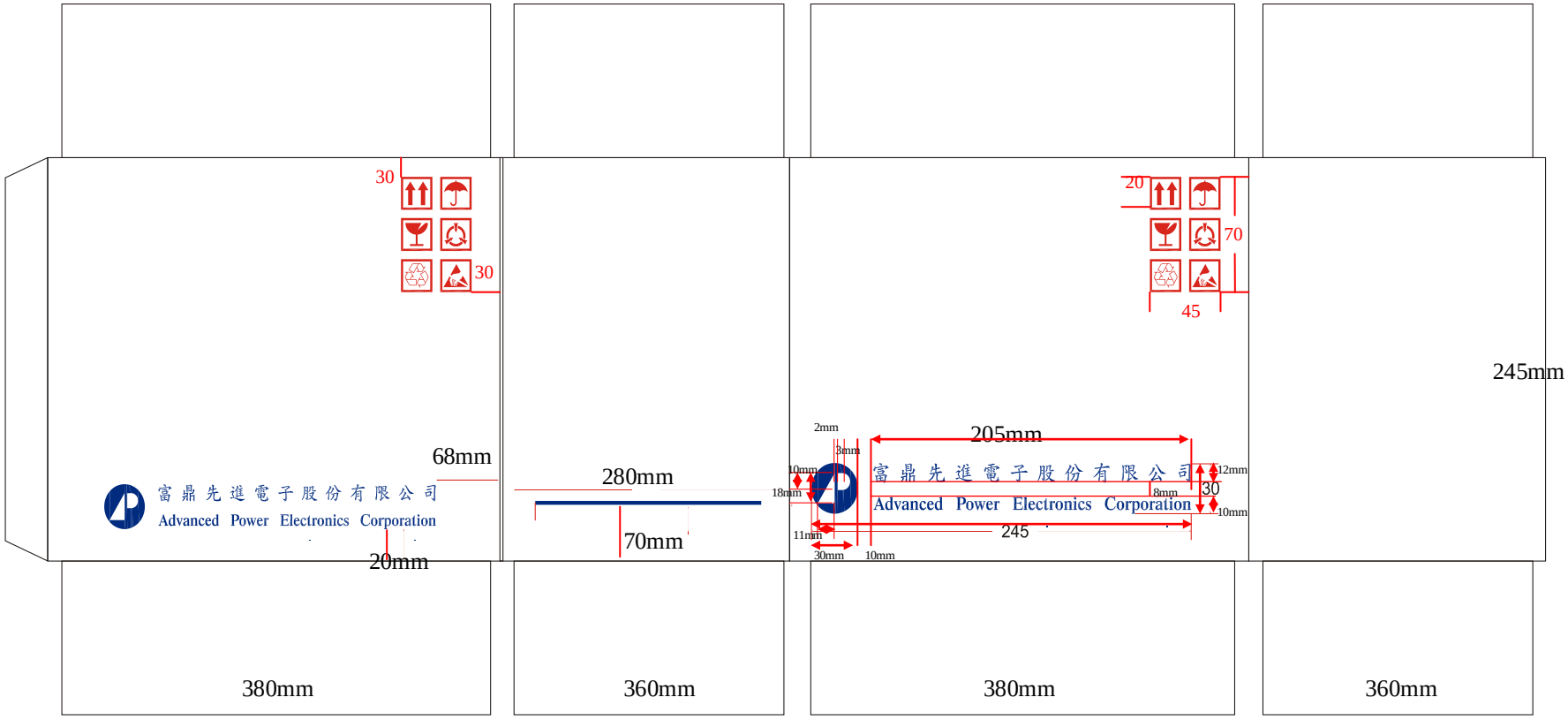


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包裝規範 Packing Spec

Attachment 2：SOT-23、SOT-26、SOT-89、SOT-25、SOT-223/323/363/723、SOT-723、SC70-4L/5L、TSOT-23/5/6、GEM2928-8、DFN3*2、DFN2*2 Carton

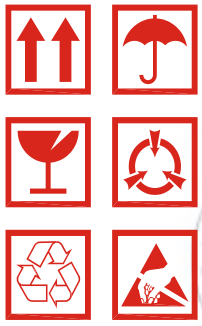


NOTE：

1. CARTON SIZE：380*360*245mm
2. MATERIAL：DOUBLE AB WALL CORRUGATED
3. COLOR OF PAPER IS YELLOWISH BROWN
4. BASIC WEIGHT：A200,100,100,130,A200(g/m²)
5. BURSTING STRENGHT：14kgf/cm²
6. TOLERANCE：±30mm
7. UNIT：mm.
8. PRINT COLOR：BLUE(PANTONE 072U)
   RED(PANTONE 186U)
9. JONIT：COMBINATION
10. IMPEDANCE：NONE
11. GTM PART NO.

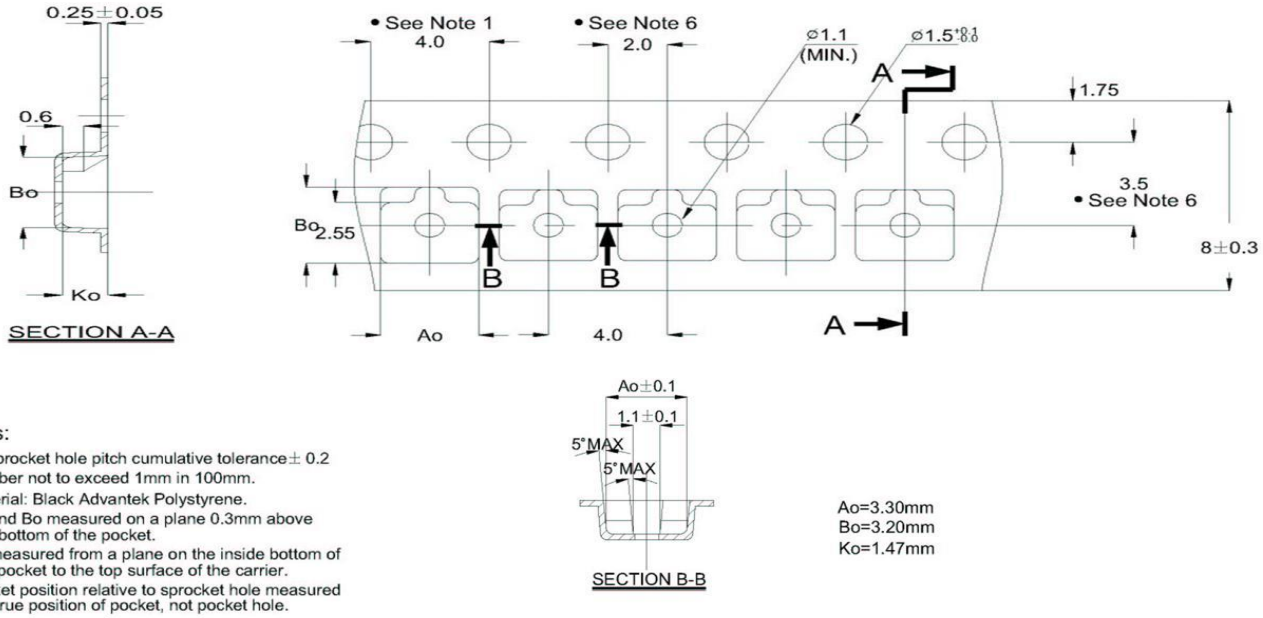
文件編號：QWMPC-7801
版　　別：48
頁　　碼：8

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Advanced Power Electronics Corporation



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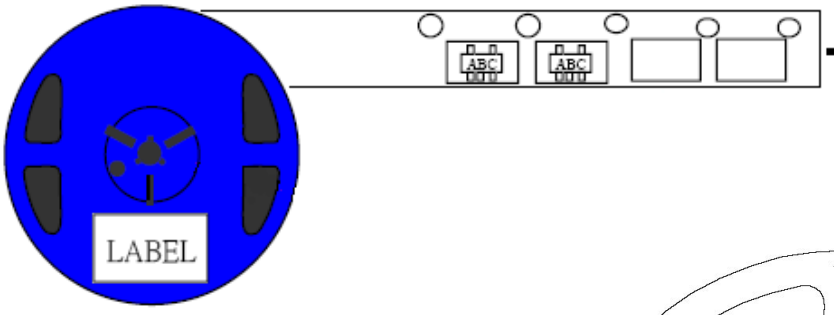
附圖四：SOT-23/5/6/TSOT-23/5/6 Tape & Reel Information



Notes:
1. 10 sprocket hole pitch cumulative tolerance± 0.2
2. Camber not to exceed 1mm in 100mm.
3. Material: Black Advantek Polystyrene.
4. Ao and Bo measured on a plane 0.3mm above the bottom of the pocket.
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

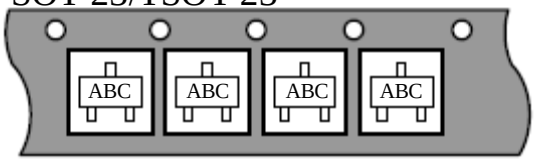
Ao=3.30mm
Bo=3.20mm
Ko=1.47mm

REEL LABEL及產品捲繞位置圖。 Reel label & Peel winding product position.

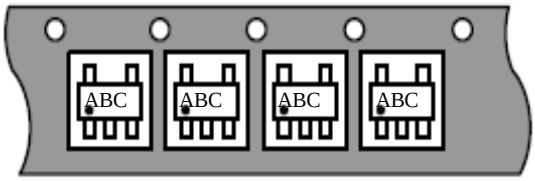


Direction of tape feed

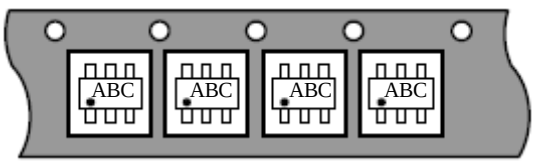
SOT-23/TSOT-23

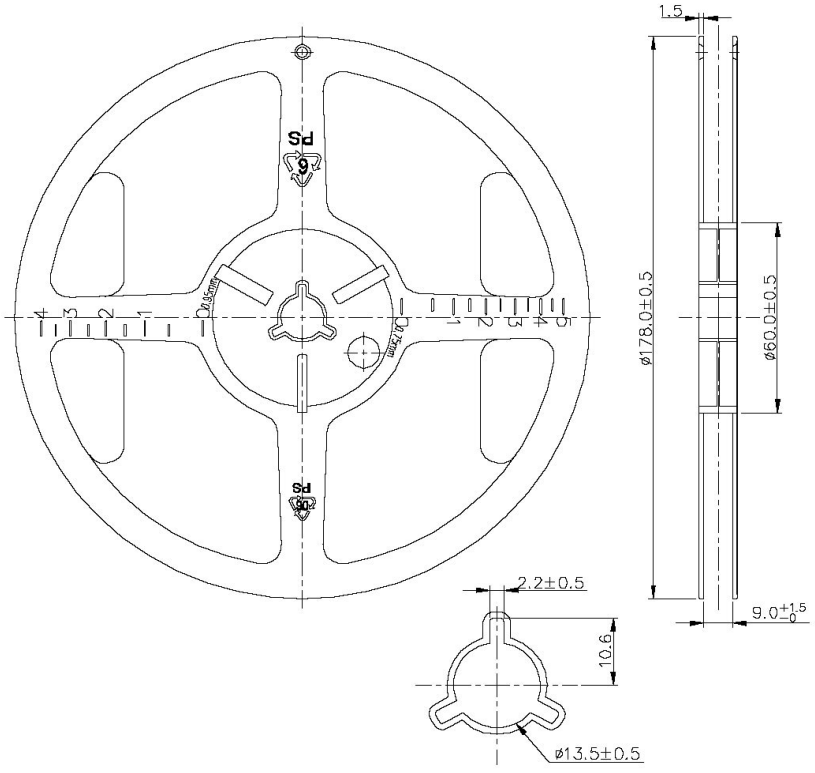


SOT-25/TSOT-25



SOT-26/TSOT-26



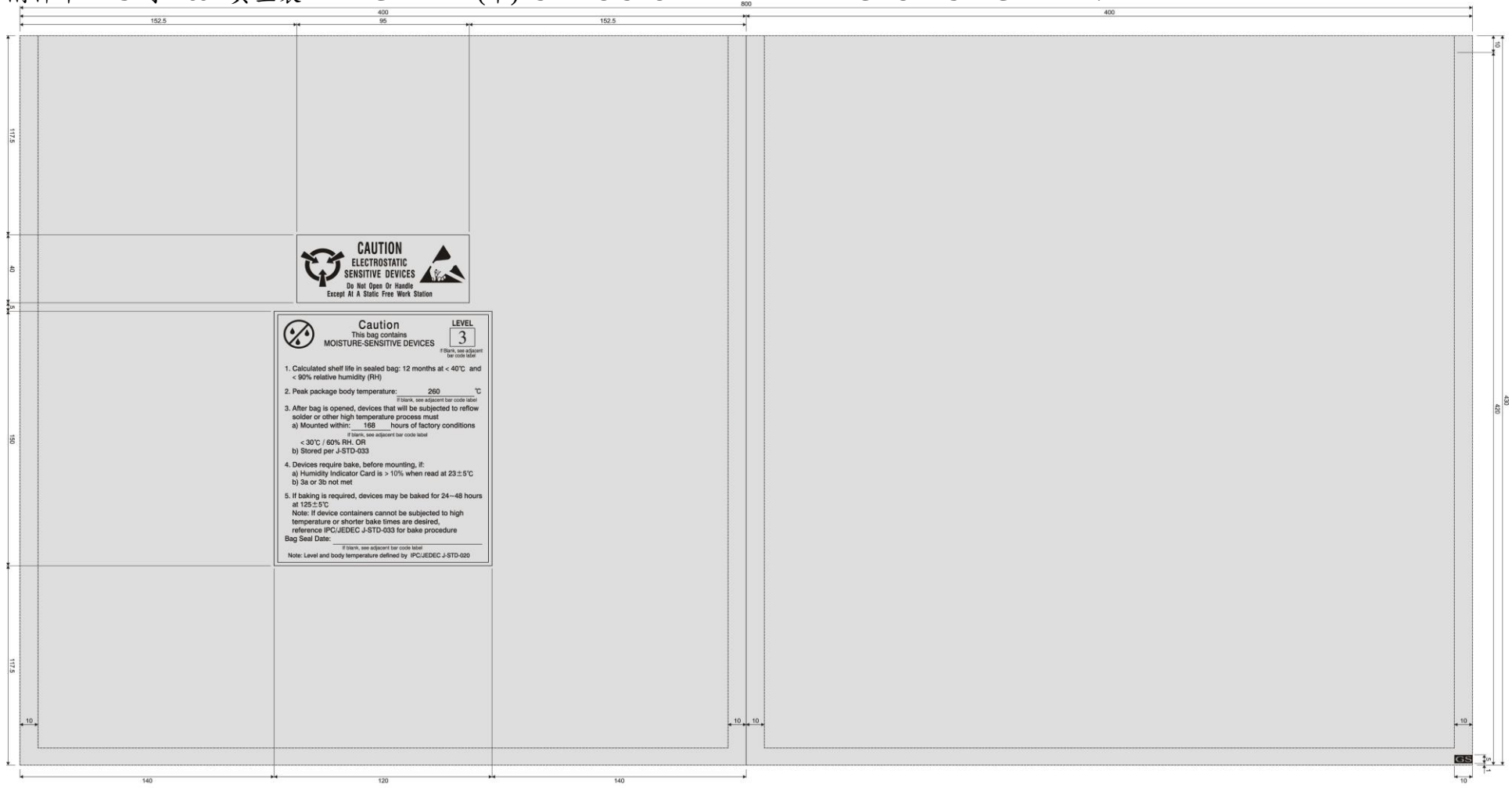


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包裝規範 Packing Spec

附件十：13 吋 Reel 真空袋 ATTACHMENT(十)ESD MOISTURE BARRIER BAG FOR 13 INCH REEL.



單　位	mm
成品尺寸	400X430(三面封)
展開尺寸	800X430
比　例	1:1
成品誤差值	±2%
編　號	AL4004301

文件編號：QWMPC-7801
版　　別：43
頁　　碼：34

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包裝規範 Packing Spec

附件十-1：13 吋 Reel 真空包裝標籤 ATTACHMENT(十-1)LABEL OF ESD MOISTURE BARRIER BAG FOR 13 INCH REEL.



文件編號：QWMPC-7801
版　　別：43
頁　　碼：35

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SOT23S-HF(M) Material list

Parts	Material Supplier	Material P/N	Country		Parts Weight (mg)	Substance	Weight (mg)	Percent	Percentage by parts	CAS No.
Compound	E'DALE	ELER-8-100HFE	Taiwan	65.09%	6.1400	Silica	4.5129	47.84%	73.50%	60676-86-0
						Epoxy Resin	0.6754	7.16%	11.00%	29690-82-2
						Phenolic Resin	0.6140	6.51%	10.00%	9003-35-4
						Metal Hydroxide	0.3070	3.25%	5.00%	Trade Secret
						Carbon Black	0.0307	0.33%	0.50%	1333-86-4
Epoxy	NAMICS	H9607	Japan	2.84%	0.2680	Resin	0.0134	0.14%	5.00%	Trade Secret
						Silver	0.2412	2.56%	90.00%	7440-22-4
						Additives	0.0134	0.14%	5.00%	Trade Secret
Lead Frame	Kangqiang	A194	China	30.23%	2.8520	Cu	2.7806	29.48%	97.495%	7440-50-8
						Fe	0.0656	0.70%	2.30%	7439-89-6
						P	0.0029	0.03%	0.10%	7723-14-0
						Zn	0.0029	0.03%	0.10%	7440-66-6
						Pb	0.0001	0.00%	0.005%	7439-92-1
Plating	Yunnan	Sn	China	1.34%	0.1260	Tin	0.12599	1.34%	99.99%	7440-31-5
						Other	0.00001	0.00%	0.01%	-
Wire	HEESUNG	AuPdCu	China	0.50%	0.0470	Copper	0.04606	0.49%	98.00%	7440-50–8
						Palladium	0.00047	0.00%	1.00%	7440-05-3
						Gold	0.00047	0.00%	1.00%	7440–57-5
				100.00%	9.4330		9.4330	100.00%		

SOT-23S(I) Material list

Parts	Material Supplier	Material P/N	Country		Parts Weight (mg)	Substance	Weight (mg)	Percentage	Percentage by parts	CAS No.
Compound	Hitachi	CEL-8240HF	China	59.86%	6.235	Epxoy Resin-1	0.249	2.39%	4.00%	Trade secret
						Epxoy Resin-2	0.249	2.39%	4.00%	Trade secret
						Phenol Resin	0.399	3.83%	6.40%	Trade secret
						Catalyst	0.031	0.30%	0.50%	Trade secret
						Carbon Black	0.012	0.12%	0.20%	1333-86-4
						Amorphous Silica	5.269	50.58%	84.50%	60676-86-0
						Crystal silica	0.025	0.24%	0.40%	14808-60-7
Die Attach	HENKEL	84-1LMISR4	China	1.18%	0.123	Sliver	0.092	0.89%	75%	7440-22-4
						Bisphenol-F Epichlorhydrin resin	0.019	0.18%	15.5%	9003-36-5
						1,4-Bis(2,3-epoxypropoxy)butane	0.009	0.09%	7.5%	2425-79-8
						Dapsone	0.002	0.02%	2%	80-08-0
Lead Frame	Rokko	A194(C194)	Singapore	30.90%	3.219	Cu	3.105	29.81%	96.460%	7440-50-8
						Fe	0.077	0.74%	2.400%	7439-89-6
						Zn	0.003	0.03%	0.100%	7440-66-6
						P	0.001	0.01%	0.020%	7723-14-0
						Pb	0.001	0.01%	0.020%	7439-92-1
						Ag	0.032	0.31%	1.000%	7440-22-4
Plating	富美達/宏利	100% Sn	China	7.80%	0.812	Sn	0.8116	7.7918%	99.95%	7440-31-5
						Other	0.0004	0.0039%	0.05%	
Wire	Heraeus	Cu1.2mil	China	0.26%	0.027	Cu	0.027	0.26%	99.9972%	7440-50-8
						Ag	0.0000003	0.000003%	0.0012%	7440-22-4
						Fe	0.0000001	0.000001%	0.0005%	7439-89-6
						Mn	0.0000001	0.000001%	0.0003%	7439-96-5
						S	0.0000002	0.000002%	0.0006%	7704-34-9
						Ni	0.0000001	0.000001%	0.0002%	7440-02-0
				100.00%	10.416		10.416	100.00%		

Recommended Reflow Profile for Lead(Pb) Free Soldering (Pure Matte Tin Plating)

Lead(Pb) free solders which require to use higher reflow temperature. Advanced Power Electronics Corp. has studied the reliability of our products at higher reflow temperature. Customer may use below temperature profile for the solders requirement.

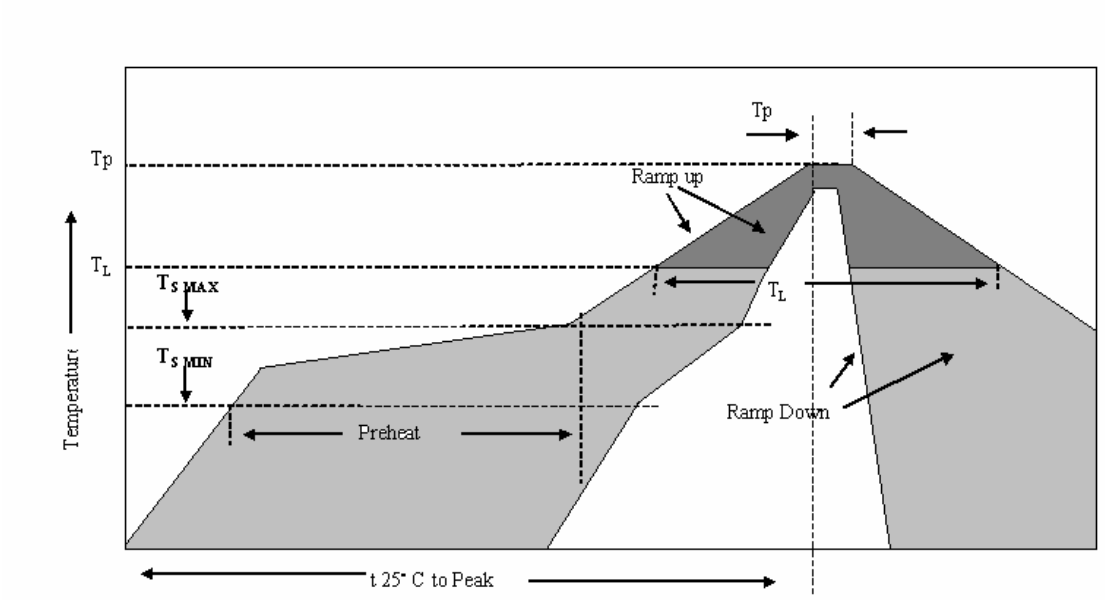


Table 1. Lead-Free Reflow Rrofile Recommendation(IPC/JEDEC J-STD-020C)	
Reflow Parameter	Lead-Free Assembly
Minimum preheat temperature(Ts_{MIN})	150° C
Maximum preheat temperature(Ts_{MAX})	200° C
Preheat Time	60-180 seconds
Ts_{MAX} TO T_L ramp-up rate	3° C/second maximum
Time above temperature T_L (t_L)	217° C 60-150 seconds
Peak Temperature (T_p)	260° C
Time 25 C To Tp	8 minute maximum
Time within 5c of Peak Tp	20-40 seconds
Ramp-down rate	6° C/second maximum

* Could meet three 3 cycles

Reliability Test Report

AP6P250N

I. Accelerated Life Times Stress Test

II. Environmental Stress Test

SOT-23S

Approved by	Prepared by
M. H. Lin	S. H. Tsai
Date: 2015/10/2	Date: 2015/10/2

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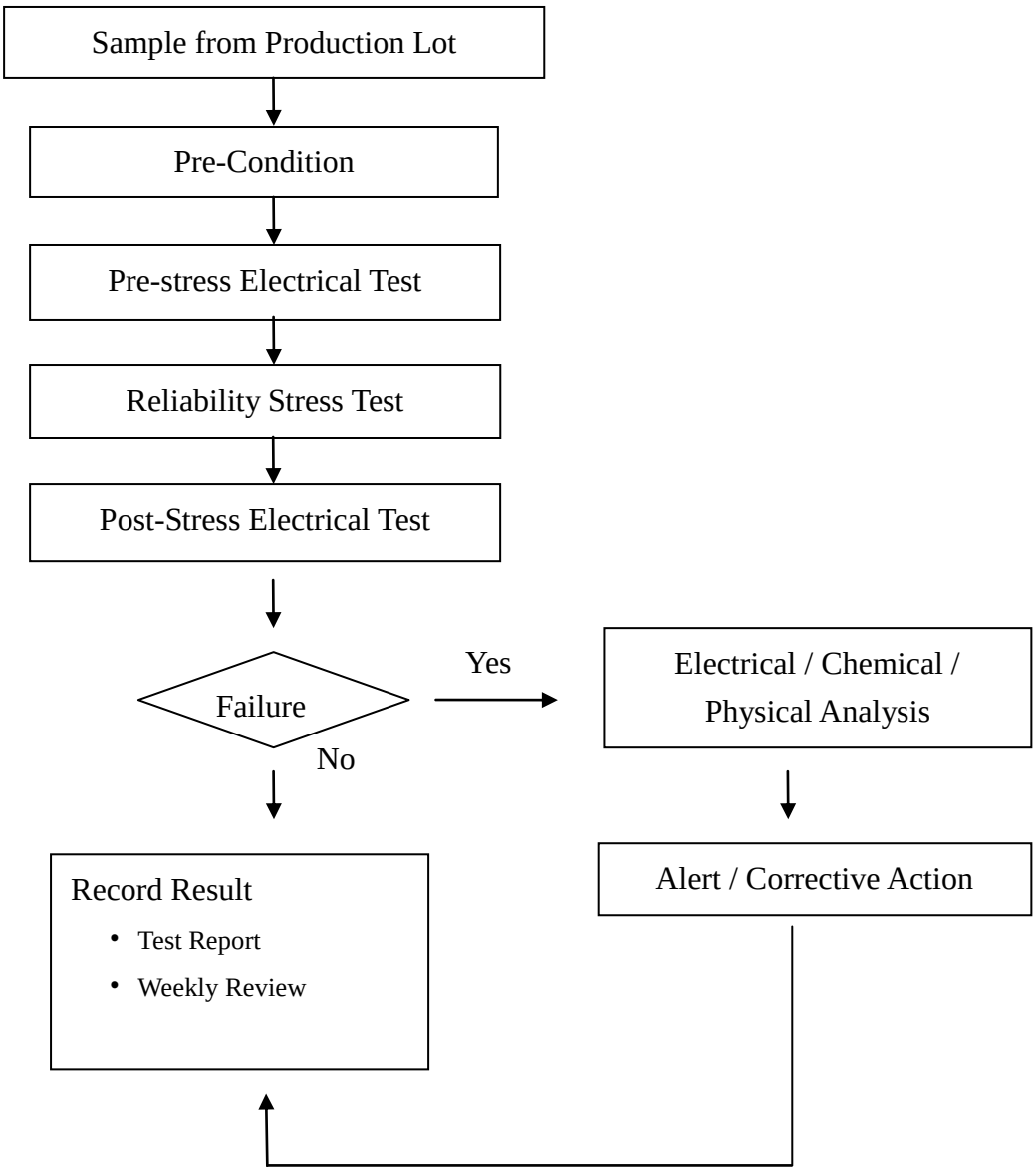
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1. Introduction

This report records the APEC product reliability test procedure, items and results; give a clear overview of reliability qualification test.

2. Test Procedure



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2.1 Pre-Condition (SMD Packages devices only)

This is to simulate the product storage, shipping and customer application environment.

Step 1: Baking 125℃ , 24hrs.

Step 2: 85℃ / 85%R.H. Soaking 168hrs. (J-STD-020 Level 1)

Step 3: IR Reflow Tmax.= 260℃ , 3cycles

2.2 Sampling plan

Based on LTPD = 10% , AC=0

3. Accelerated Life Time Stress Test

3.1 Test Level

☐ Routine Monitor Qualification

■ New Product Qualification

☐ Engineer / Customer Request Qualification

3.2 Test Result

Test Item	Sample Size	Total Device (hours)	Result	Failure Rate (FITs)	MTTF' (10^6) Devices hrs.
High Temperature Gate Bias(HTGB)	77	77000 hrs	Pass	338.88	2.95
High Temperature Reverse Bias (HTRB)	77	77000 hrs	Pass	338.88	2.95

CL = 90% ; Ea = 0.7eV ; Operating Temp. = 70℃

3.3 Test Item Description

3.3.1 High Temperature Gate Bias (HTGB)

- Reference Standard

  EIAJ ED-4701 D323

  HTGB Operation spec. (QWRAD-7117)

- Condition:

  Temperature: Max. Operating Temperature

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Test Point: 0, 168, 500, 1000 Hours Nominal
Bias: Max. VGS Rating

3.3.2 High Temperature Reverse Bias (HTRB)

- Reference Standard
  EIAJ ED-4701 D321
  HTRB Operation spec. (QWRAD-7118)
- Condition:
  Temperature: Max. Operating Temperature
  Test Point: 0, 168, 500, 1000 Hours Nominal
  Bias: VS=VG=0V, VD= 80% of Max. BVDSS Rating

4. Environmental & Package Stress Test

4.1 Test Level

☐ Routine Monitor Qualification
■ New Product Qualification
☐ Engineer / Customer Request Qualification

4.2 Test Result

Test Item	Sample Size	Test Time (hours/ cycles)	Result
HTST	77	1000 hrs.	Pass : 0/77
H3TRB	77	1000 hrs.	Pass : 0/77
THST	77	1000 hrs.	Pass : 0/77
PRCL	77	15K cyc.	Pass : 0/77
TCT	77	1000 cyc.	Pass : 0/77
PCT	77	168 hrs.	Pass : 0/77
HAST	77	96 hrs.	Pass : 0/77

The pre-conditioning (SMD Packages devices only)

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4.3 Test Item Description

4.3.1 High Temperature Storage Test (HTST)

- Reference Standard
  EIAJ ED-4701 B111A
  HTST Operation spec. (QWRAD-7116)
- Condition:
  Temperature: 150℃
  Test Point: 0, 1000 Hours Nominal
  Bias: no Bias

4.3.2 High Temperature & Humidity Reverse Bias (H3TRB)

- Reference Standard
  EIAJ ED-4701 B122A
  H3TRB Operation spec. (QWRAD-7111)
- Condition:
  Temperature: 85℃
  Relative Humidity: 85% R.H.
  Test Point: 0, 168, 500, 1000 Hours Nominal
  Bias: VS=VG=0V,
  VD= 80% of Max. BVDSS Rating up to 100V

4.3.3 Temperature Humidity Storage Test (THST)

- Reference Standard
  EIAJ ED-4701 B121
  THST Operation spec. (QWRAD-7115)
- Condition:
  Temperature: 85℃
  Relative Humidity: 85% R.H.
  Test Point: 0, 1000 Hours Nominal
  Bias: no bias

4.3.4 Power Cycling Test (PRCL)

- Reference Standard

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EIAJ ED-4701 D322
PRCL Operation spec. (QWRAD-7114)

- Condition:

Temperature: Ta=25℃ Tj=△100℃ Ton=2 Minute, Toff=2 Minute
Test Point: 0, 10K, 15K Cycles Nominal
Bias (Set to give) : Tj=△100℃

4.3.5 Temperature Cycling Test (TCT)

- Reference Standard

JESD22-A104
TCT Operation spec. (QWRAD-7113)

- Condition:

Temperature: Tmin.= -55℃ , Tmax.=150℃ , △T=205℃
Test Point: 0, 1000 cycles Nominal

4.3.6 Pressure Cooker Test (PCT)

- Reference Standard

JESD22-A102C
PCT Operation spec. (QWRAD-7110)

- Condition:

Temperature: 121℃
Relative Humidity: 100% R.H.
Pressure: 2 atm
Test Point: 0, 168 Hours Nominal

4.3.7 Highly Accelerated Stress Test (HAST)

- Reference Standard

JESD22-A118

- Condition:

Temperature: 130℃
Relative Humidity: 85% R.H.
Pressure: 33.3 psia / 230kPa
Test Point: 0, 96 Hours Nominal

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