N-Channel MOSFET

Rev. 2.01 – April 2007
SAMWIN SOUTH Semiconductors

1. Content

2. General Information

Product Name: For All Products

Function: N-Channel MOSFET

Wafer process: 0.8um VDMOS

Available plastic package types: TO-92 TO-251(252) TO-220(F)

Locations:

Product development	**Samwin South Semiconductors，ShenZhen，China**	**Samwin**
Wafer plant	**Silan Semiconductor，Hangzhou, China**	**F1**
	CSMC	**F2**
QC responsibility	**Samwin**	
Assembly	**Huanshan Electronics, ShanTou, China （TO-220/F，TO-92）**	**A1**
	Mingxing Electronics, Wuxi, China (TO-251, TO-252)	**A3**
	Changjiang Electronics, Jiangying, China (TO-92)	**A2**
Probe test	**F1,F2**	
Final test	**Huanshan Electronics, ShanTou, China（TO-220/F，TO-92）**	
	Mingxing Electronics, Wuxi, China (TO-251, TO-252)	
	Changjiang Electronics, Jiangying, China (TO-92)	
Quality Assurance	**Samwin**	
Reliability testing	**Samwin, F1**	
Failure analysis	**Samwin, F1,F2,A1,A2,A3**	

Quality Assurance Management

Signed.....

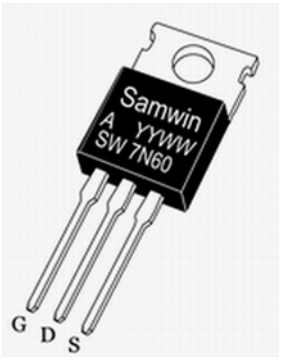
3.1 Wafer Process Technology

Process type (Name):	**0.8um VDMOS**
Base material:	**Silicon**
Wafer Thickness (final)	**XXXμm**
Wafer diameter	**XXXmm**
Number of masks	**XXX**
Gate oxide	
Material	**Silicon oxide**
Thickness	**XXXXA**
Polysilicon	
Number of layers	**1**
Thickness	**XXXXA**
Metal	
Number of layers	**1**
Layer 1 material	**AL**
Passivation	**NONE**

3.2 Package Technology

3.2.1 Package Information

	TO-92	TO-251(252)	TO-220(F)
Package weight	0.2 g		2.05g (2.2g)
Chip separation method		Sawing	
Lead frame			
Material		Bar Cu	
Type	TO-92DT(H)	KFC-30	SANSUNG TSP
Lead plating		Electroplated Sn/100	
Die attach	Silver paste	Soft Solder	Soft Solder
Material		Pb/Sn/Ag 93.5/5/1.5	
Type	DAD-87		
Wire bonding			
Material	AU wire	AL wire	AL wire
Diameter	0.8mil(G) 0.8×2mil(s)	6mil (G) 10mil(s)	6mil(G) 10mil (S)
Method		Ultrasonic	
Molding			
Material		EPOXY	
Type	SI-7200DX2 (HF) KL-G200	EK5600H (HF) EK5600G	SI-7200DX2 (HF)SG8200DS/8300DS
Flammability rating		UL94 V-0	
Marking			
Method		Laser Print	
Coding (Example: SW 7N60)			



YYWW (process code include date info.)

Dry packing		None	
Tape packed	TO-92	TO-251(252)	TO-220(F)
Primary	Box	Tube (Tape)	Tube
Material	Tape paper	Antistatic PVC	Antistatic PVC
Number per unit	2000	80 (2500)	50
Secondary	Box	---	---
Material	Cardboard	---	---
Number per unit	30000	32000 (20000)	8000

Labeling (minimum)	**Device type, Quantity, Date Code, Prod. code**
Bar coding	**Code 39 to EIA-556-A**

3.2.2 Other available packages

Other package available： TO-126， TO-263

3.3 Test

Probe equipment	**VR/30A KE**
Probe temperature	**25±2℃**
Final Test equipment	**881-TT TESEC** **DTS-1000 JUNO**
Final Test temperature	**25±2℃**

3.4 Wafer Process Control

All the inspections and controls are defined as a process step in the production management control system. PC system could be summarized as follows:

MATERIAL RECEIPT

Critical raw materials received

INCOMING INSPECTION

Raw materials inspected against SAMWIN procurement specifications.

WAFER FABRICATION

Raw wafers are processed through diffusion, photolithography, implant, thin films, and EPI.

QUALITY CONTROL

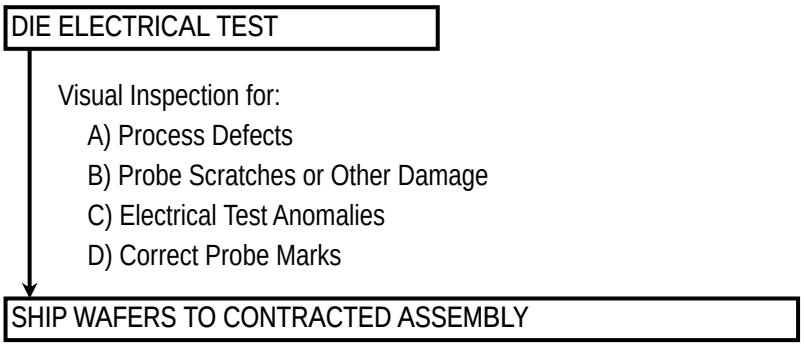
A) Critical Dimensions
B) Oxide Thickness
C) Thin Film Thickness
D) Sheet Resistivity
E) Reflectivity
F) CV Drift
G) Mask Alignment
H) Particles
I) Etch Completion
J) Visual Defect

WAFER ACCEPTANCE

A) Visual – Each wafer is visually inspected under a microscope for defects, mask alignment, and mask sequence.
B) Parametric Test – Four specially designed test sites on each wafer are tested for process and product parameters to verify processing integrity.

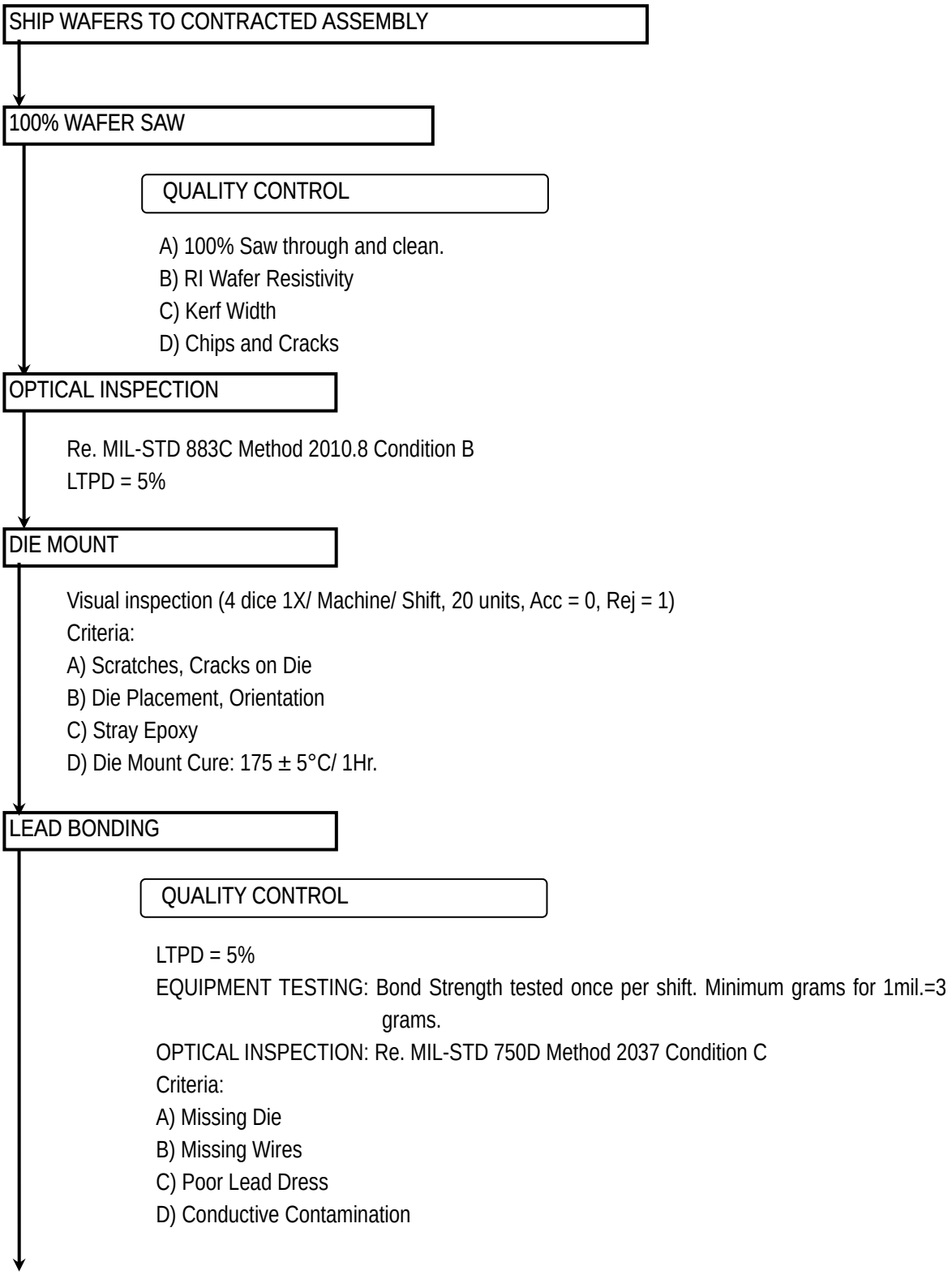
100% DIE ELECTRICAL TEST

All die are 100% tested for functionality and parameter conformance. Yields used for process, design, and test analysis.



Critical process parameters are identified by using F.M.E.A. and other advanced tools. Specific steps of wafer process quality control are defined as hereafter:

3.5 Assembly Process Control



MOLD

Post Mold Cure – 175 ± 5°C/ 6 Hr.

QUALITY CONTROL

(4X/Shift, 20 units, Acc = 0, Rej = 1)
Criteria:
A) Deflash
B) Package Voids
C) Bubbles, Blisters

TRIM & FORM LEADS

QUALITY CONTROL

(4X/Shift, 20 units, Acc = 0, Rej = 1)
Criteria:
A) Lead Defects
B) Burrs or Incomplete Trim
C) Mold Flash

LEAD SOLDER PLATING OR SOLDER DIPPING

QUALITY CONTROL: SOLDER DIP/SOLDER PLATE

LTPD = 5%
Criteria:
A) Missing Plating
B) Extraneous Solder
C) Flaking, Peeling

QUALITY CONTROL: SOLDER THICHNESS

X-ray fluoroscopy on 5 units/lot
Solder Dip = 200 micro inch minimum
Solder Plate = 300 micro inch minimum

QUALITY CONTROL: SOLDERABILITY

Re. MIL-STD 750D Method 2026.10 - 6 units
Criteria:
A) 100% Coverage on Functional Area of Lead
B) Solder Bridging, Lump, Ball
C) Contamination

PRODUCTION FINAL TEST (25°C)

Every unit tested for conformance to all guaranteed datasheet parameters

ELECTRICAL TEST (25°C)

100% production tested to guarantee an outgoing electrical AQL of 0.1% for guaranteed electrical parameters.

MARK

QUALITY CONTROL: MARK PERMANENCY

Re. MIL-STD 883C Method 2015
(2X/Shift, 22 units, Acc = 0, Rej = 1)

FINAL VISUAL INSPECTION

QUALITY CONTROL

AQL = .025%
Criteria:
A) Marking Defects
B) Lead Defects
C) Package Defects

PACK AND SHIP TO SAMWIN

3.6 OQC(Out-going Quality Control)

PACK AND SHIP TO SAMWIN

INCOMING INSPECTION

Criteria:
A) Check Mark Quality and Permanency Re. MIL-STD750D Method
B) Check Lead Form and Plating Quality
C) Check Solderability
D) Check for any Gross Package or Lead Deformities

INCOMING ELECTRICAL TEST (HOT)

Test all parameters guaranteed by the datasheet at temperature. AQL=0.1%

ELECTRICAL TEST (HOT)

Sample pulled Re. MIL-STD 105D to guarantee an AQL level of 0.1% minimum for HOT Test parameters.

PRODUCTION VISUAL INSPECTION

Every unit checked for correct marking, orientation, and any package defects obtained during assembly, test, or production conditioning.

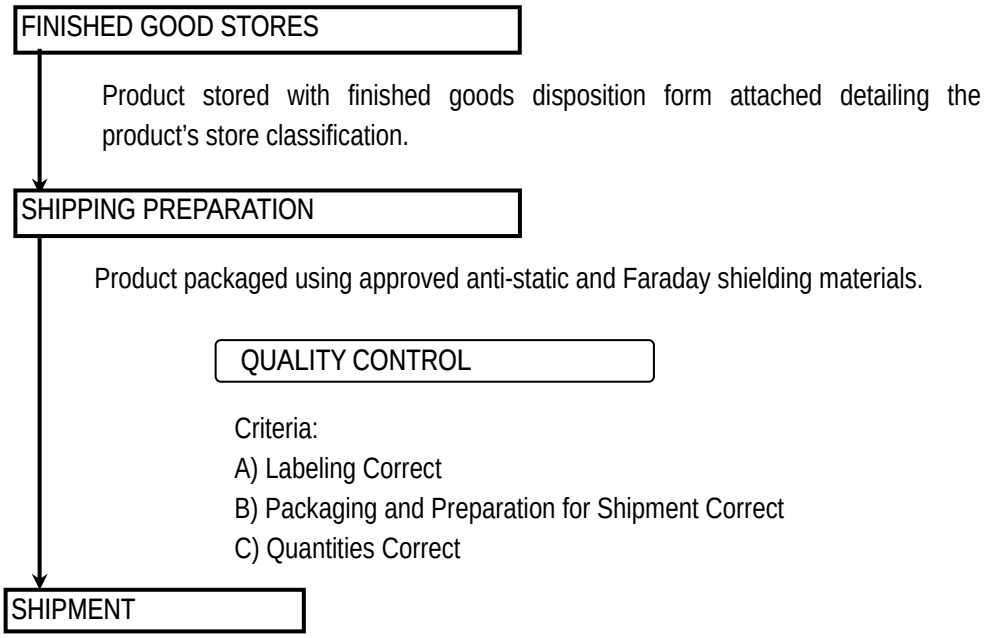
QUALITY CONTROL

A sample is pulled Re. MIL-STD 105D to guarantee an AQL of 0.1% for visually reject able defects.

PRODUCTION PRODUCT LABELING

QUALITY CONTROL

Each sub-lot examined by QA to verify conformance to standards. The review includes:
A) Reliability Life Test Data checked.
B) Humidity Performance checked
C) ESD Sensitivity check per product per wafer fab process
D) Labeling and Device Marking checked


FINISHED GOOD STORES
Product stored with finished goods disposition form attached detailing the product's store classification.
SHIPPING PREPARATION
Product packaged using approved anti-static and Faraday shielding materials.
QUALITY CONTROL
Criteria:
A) Labeling Correct
B) Packaging and Preparation for Shipment Correct
C) Quantities Correct
SHIPMENT

4. Qualification

All product qualifications are split into three distinct steps as shown above. This same procedure is also used to qualify a change. Before a product is released for use, it must have been manufactured using a qualified wafer and package process. Before a device is released for production processing, it must also have successfully completed its required specific qualification.

The standard tests which are used for this procedure are shown in the section "Qualification Flow"

4.1 Change Procedure

All changes are controlled by ECN (Engineering Change Notice). All major changes are notified to those customers using products which are affected by the change.

A major change is defined as a change which affects the electrical and/or mechanical specification as defined in the datasheet or which affects the following parameters as defined hereafter:

1 General Major Changes
1-1 Manufacturing line
1-2 Sequence of fabrication process cycle
1-3 Material
1-4 Electrical parameters
1-5 Dimensions
1-6 Pad location
1-7 Die size

2 Changes specific to wafer fabrication area
2-1 Doping process
2-2 Oxide formation method
2-3 Equipment change
2-4 Layer thickness
2-5 Module dimensions

3 Changes specific to assembly process area
3-1 Sawing process
3-2 Die attach process
3-3 Wire interconnect method
3-4 Molding process
3-5 Tinning process

4 Changes specific to test area
4-1 Specification limit
4-2 Test coverage reduction
4-3 Product identification
4-4 Final conditioning

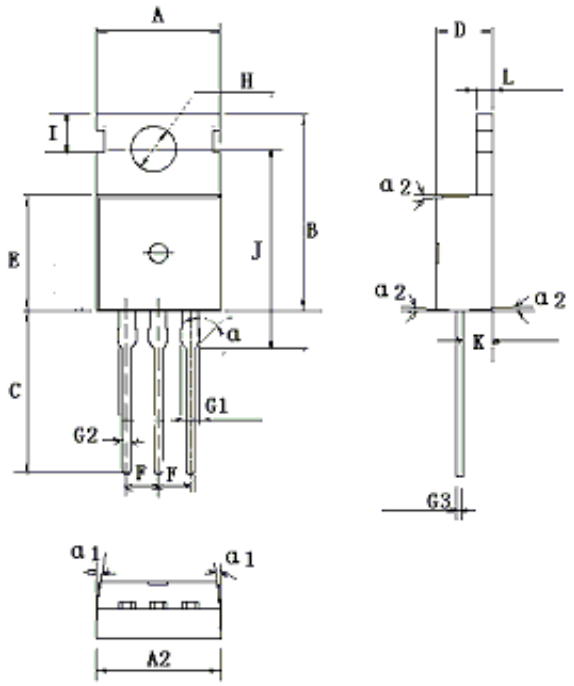
4.2 Qualification Flow

General Requirements for Plastic packaged MOSFET：

	Description	Test Condition	Qualification type	Re. Standard	Acceptance
1	Temperature Cycle Test	TA = -55 °C <-> 25 °C <-> +150°C (air to air), t = 15 – 5 –15 min. / cycle, Bias = None.	1000 Cycles	Mil-Std-750D Method 1051	0/3 x 28
2	Pressure Cooker Test	TA = 121 °C +/- 2 °C, RH = 100%, P = 15PSIG, Bias = None	168 Hours	Mil-Std-202F	0/3 x 28
3	High Temperature Reverse Bias Test	TA = +150/175°C, Reverse Bias = Specification Limit X 0.8.	1000 hours	MIL-STD-750D, method 1042.3	0/3 x 28
4	High Temperature Gate Bias Test	TA = +150/175°C, Reverse Bias = Specification Limit X 0.8.	1000 hours	MIL-STD-750D, method 1042.3	0/3 x 28
5	Power Cycle Test	TA = +25 °C <-> +125 °C, Power Dissipation = ~2.5 Watts	3000 Cycles	MIL-STD-750D, method 1037.2	0/3 x 28
6	Scanning acoustic microscope			MIL-STD-750D, method 2077.3	0/3 x 50

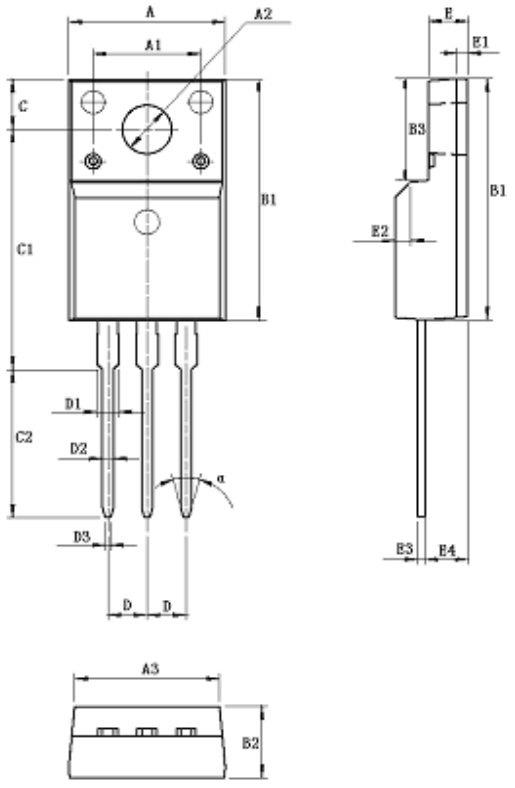
5. Package Dimensions

TO-220



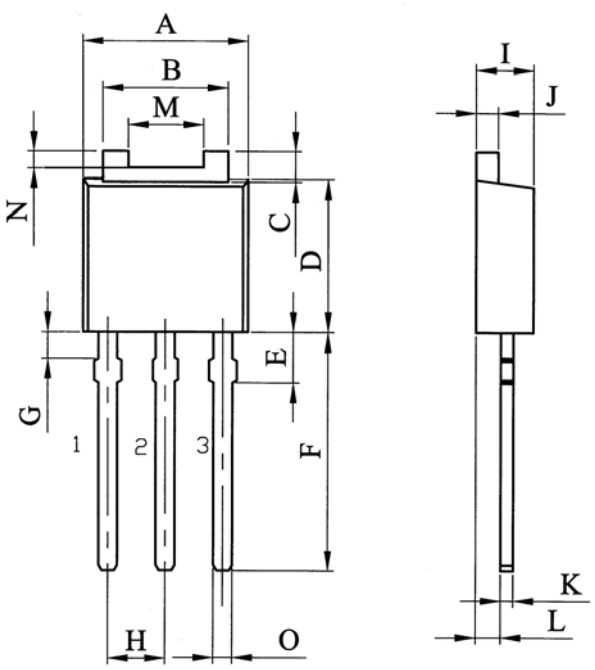
A(mm)	9.66~10.28
A2(mm)	9.80~10.20
B(mm)	15.6~15.8
C(mm)	12.70~14.27
D(mm)	4.30~4.70
E(mm)	8.59~9.40
F(mm)	typical 2.54
G1(mm)	1.32~1.72
G2(mm)	0.70~0.95
G3(mm)	0.4~0.60
H(mm) dia.	3.50~3.83
I(mm)	2.7~2.9
J(mm)	15.70~16.25
K(mm)	2.20~2.90
L(mm)	1.15~1.40
a(degree)	45°
a2(degree)	3°±0.5°
a3(degree)	3°±0

TO-220F



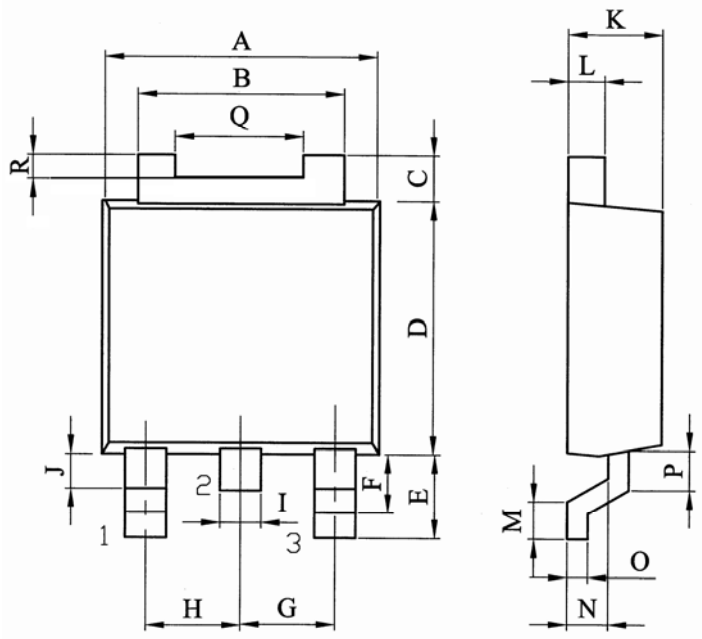
A(mm)	10.16±0.20	
A1(mm)	7.00	
A2(mm)dia.	3.18±0.10	
A3(mm)	9.46±0.20	
B1(mm)	15.87±0.20	
B2(mm)	4.70±0.20	
B3(mm)	6.68±0.20	
C(mm)	3.30±0.10	
C1(mm)	15.80±0.20	
C2(mm)	9.75±0.20	
D(mm)	typical 2.54	
D1(mm)	1.47(MAX)	
D2(mm)	0.80±0.10	
D3(mm)	0.35±0.10	
E(mm)	2.54±0.20	
E1(mm)	0.70	
E2(mm)	1.0×45°	
E3(mm)	0.5	+0.10 / -0.05
E4(mm)	2.76±0.20	
α(degree)	30°	

TO-251



A(mm)	6.4-6.8
B(mm)	4.8-5.53
C(mm)	0.9-1.3
D(mm)	5.9-6.3
E(mm)	1.8-2.3
F(mm)	8.9-10.1
G(mm)	1.2-1.53
H(mm)	2.2-2.4
I(mm)	2.1-2.5
J(mm)	0.4-0.99
K(mm)	0.4-0.6
L(mm)	0.9-1.1
M(mm)	3.6-4.0
N(mm)	0.4-0.6
O(mm)	0.66-0.92

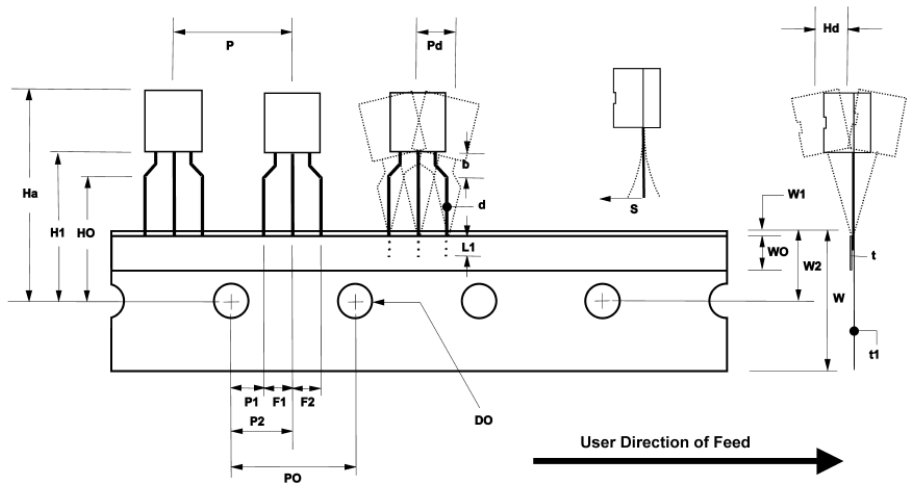
TO-252



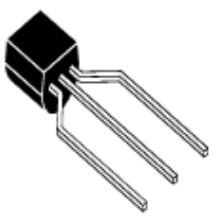
A(mm)	6.4-6.8
B(mm)	4.8-5.53
C(mm)	0.9-1.3
D(mm)	5.9-6.3
E(mm)	2.3-2.9
F(mm)	1.8-2.2
G(mm)	2.2-2.4
H(mm)	2.22.4
I(mm)	0.660.92
J(mm)	0.6-0.95
K(mm)	2.1-2.5
L(mm)	0.4-0.6
M(mm)	0.80-1.4
N(mm)	0.9-1.1
O(mm)	0.4-0.6
P(mm)	0.81-1.01
Q(mm)	3.6-4.0
R(mm)	0.4-0.6

TO-92

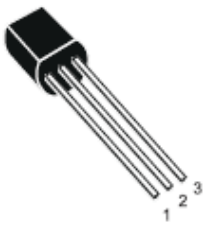
TO-92 Tape Dimensions



Item Description	Symbol	Dimension (mm)
Base of Package to Lead Bend	b	3.00 ± 0.40
Component Height	Ha	24.00 ± 0.50
Lead Clinch Height	HO	16.00 ± 0.40
Component Base Height	H1	19.00 ± 0.40
Component Alignment (side/side)	Pd	0.80 max
Component Alignment (front/back)	Hd	1.00 max
Component Pitch	P	12.70 ± 0.60
Feed Hole Pitch	PO	12.70 ± 0.20
Hole Center to First Lead	P1	3.75 ± 0.30
Hole Center to Component Center	P2	6.35 ± 0.30
Lead Spread	F1/F2	2.60 +0.30/−0.20
Lead Thickness	d	0.45 +1.00/−0.05
Taped Lead Length	L1	2.50 max
Taped Lead Thickness	t	0.70 ± 0.20
Carrier Tape Thickness	t1	0.40 ± 0.05
Carrier Tape Width	W	18.50 ± 0.20
Hold - down Tape Width	WO	6.00 ± 0.40
Hold - down Tape position	W1	0.30 +0.20/−0.30
Feed Hole Position	W2	9.00 ± 0.40
Sprocket Hole Diameter	DO	4.00 ± 0.20
Lead Spring Out	S	0.40 max



TO-92 (Ammopack)



TO-92

6. User Information

The user must protect components against EOS and ESD damages by grounding personal and workstations.

7. Environmental Information

The SAMWIN Environmental Policy aims at:

- Reducing the use of harmful chemicals in its processes
- Reducing the content of harmful materials in its products
- Using re-cyclable materials wherever possible
- Reducing the energy content of its products

As part of that plan, Ozone Depleting Chemicals are being replaced either by SAMWIN or its subcontractor's processes.

8. Other Data

8.1 Approval Certificate

FAB ISO 9001

FAB ISO 14001

Assembly ISO 16949

Assembly ISO 14001

Assembly ISO 2000

Assembly PHILIPS Semiconductors Certificate

TO-220 SGS report 2006.Aug

TO-220F SGS report 2006.Aug

8.2 Datasheet Reference

Direct access on the web to datasheet at:

http://www.samwinsemi.com

8.3 Address Reference

All enquiries relating to this document should be addressed to the following:

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