

N-CHANNEL MOSFET

# MTN7002ZHS3

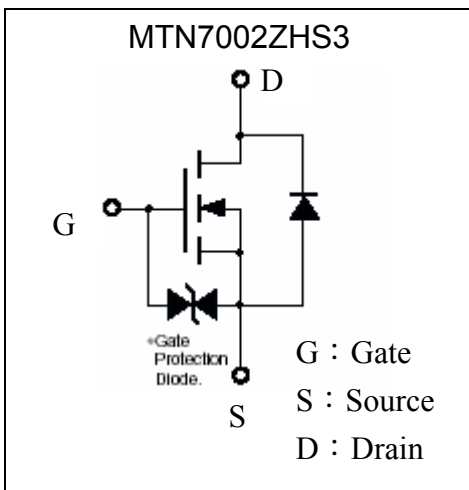
## Description

The MTN7002ZHS3 is a N-channel enhancement-mode MOSFET.

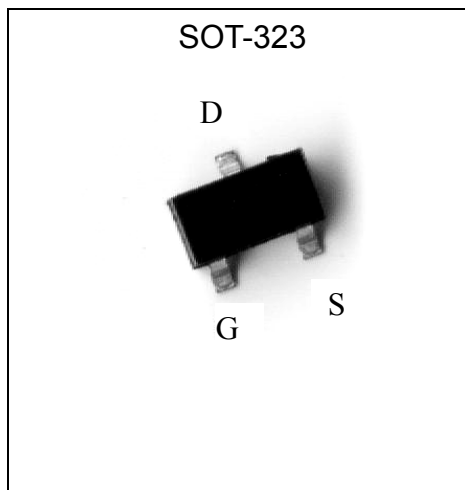
## Features

- Low on-resistance
- High ESD
- High speed switching
- Low-voltage drive(4V)
- Easily designed drive circuits
- Easy to use in parallel
- Pb-free package

## Symbol



## Outline





**Absolute Maximum Ratings (Ta=25°C)**

Parameter		Symbol	Limits	Unit
Drain-Source Voltage		V <sub>DSS</sub>	60	V
Gate-Source Voltage		V <sub>GSS</sub>	±20	V
Drain Current	Continuous	I <sub>D</sub>	115	mA
	Pulsed	I <sub>DP</sub>	700 *1	mA
Drain Reverse Current	Continuous	I <sub>DR</sub>	115	mA
	Pulsed	I <sub>DRP</sub>	700 *1	mA
Total Power Dissipation		P <sub>D</sub>	200 *2	mW
ESD susceptibility			1250 *3	V
Channel Temperature		T <sub>CH</sub>	+150	°C
Storage Temperature		T <sub>stg</sub>	-55~+150	°C

Note : \*1. Pulse Width ≤ 300µs, Duty cycle ≤ 2%

\*2. When the device is mounted on a glass epoxy board with area measuring 1x0.75x0.62 inch

\*3. Human body model, 1.5kΩ in series with 100pF

**Electrical Characteristics (Ta=25°C)**

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV <sub>DSS</sub> *	60	-	-	V	V <sub>GS</sub> =0, I <sub>D</sub> =10µA
V <sub>GS(th)</sub>	1	-	2.5	V	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250µA
I <sub>GSS</sub>	-	-	±10	µA	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0
I <sub>DSS</sub>	-	-	1	µA	V <sub>DS</sub> =60V, V <sub>GS</sub> =0
R <sub>DS(ON)</sub> *	-	3.6	5.5	Ω	I <sub>D</sub> =100mA, V <sub>GS</sub> =5V
	-	3	5		I <sub>D</sub> =100mA, V <sub>GS</sub> =10V
G <sub>FS</sub>	100	-	-	mS	V <sub>DS</sub> =10V, I <sub>D</sub> =100mA
C <sub>iss</sub>	-	7.32	-	pF	V <sub>DS</sub> =10V, V <sub>GS</sub> =0, f=1MHz
C <sub>oss</sub>	-	3.42	-		
C <sub>rss</sub>	-	7.63	-		

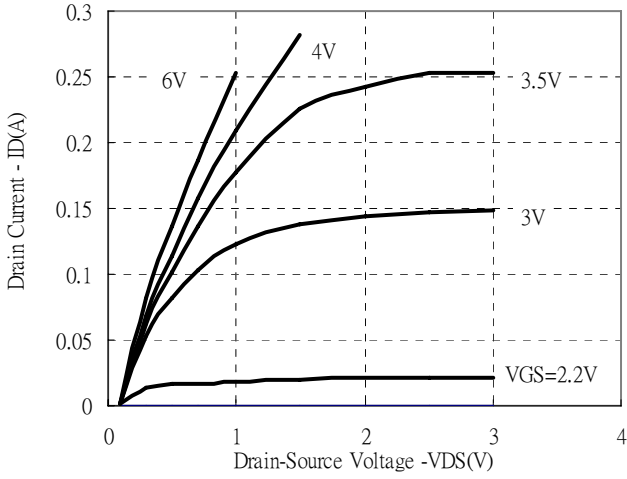
\*Pulse Test : Pulse Width ≤ 380µs, Duty Cycle ≤ 2%

**Ordering Information**

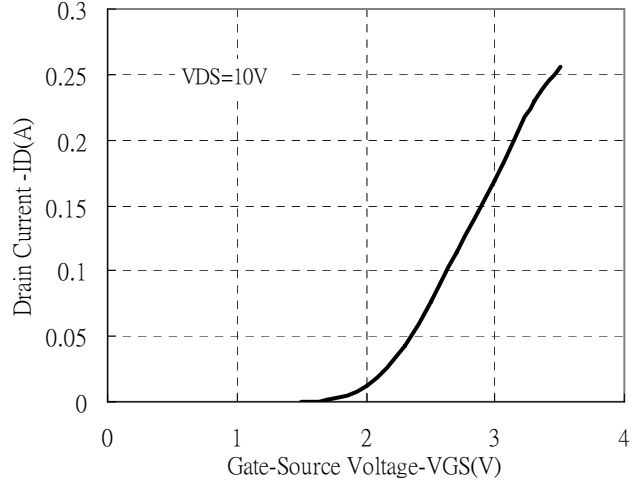
Device	Package	Shipping	Marking
MTN7002ZHS3	SOT-323 (Pb-free)	3000 pcs / Tape & Reel	72

**Characteristic Curves**

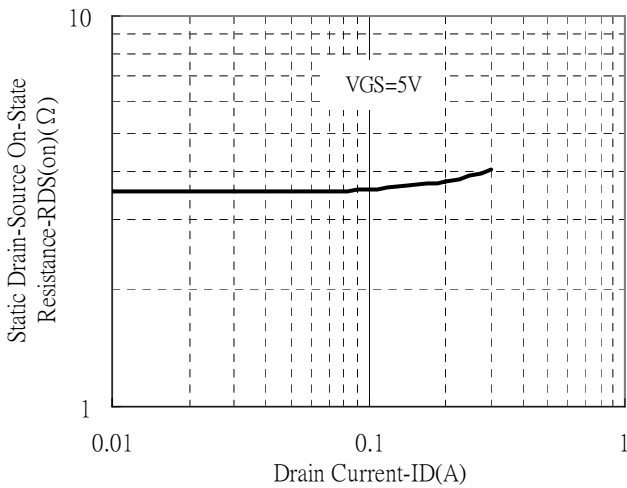
Typical Output Characteristics



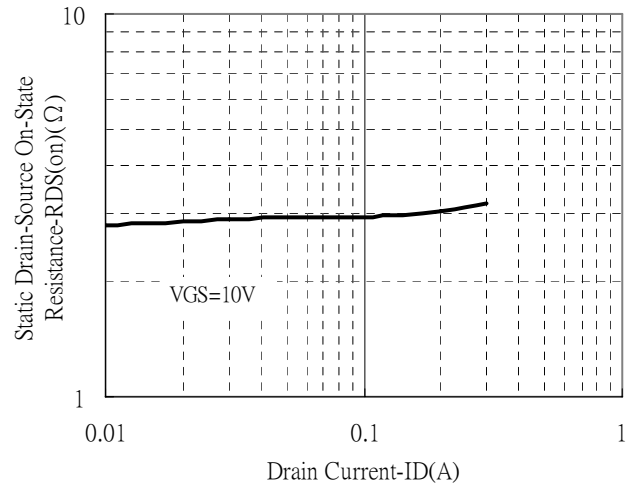
Typical Transfer Characteristics



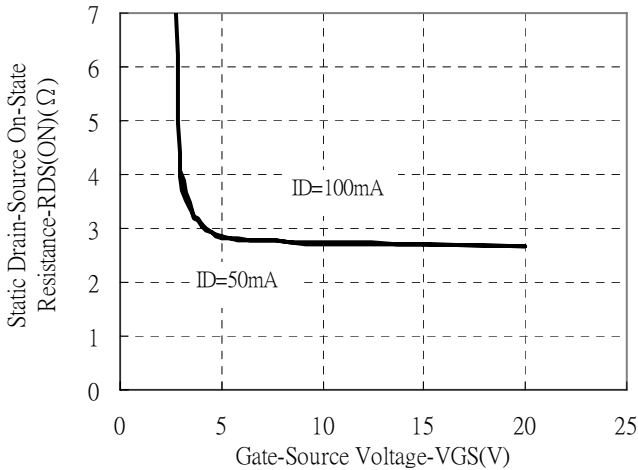
Static Drain-Source On-State resistance vs Drain Current



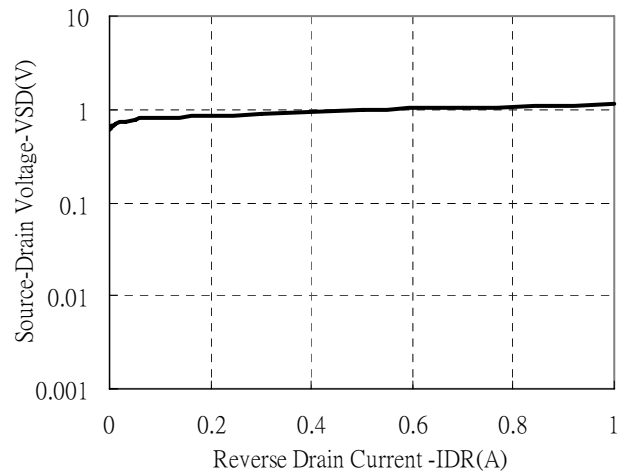
Static Drain-Source On-State resistance vs Drain Current



Static Drain-Source On-State Resistance vs Gate-Source Voltage

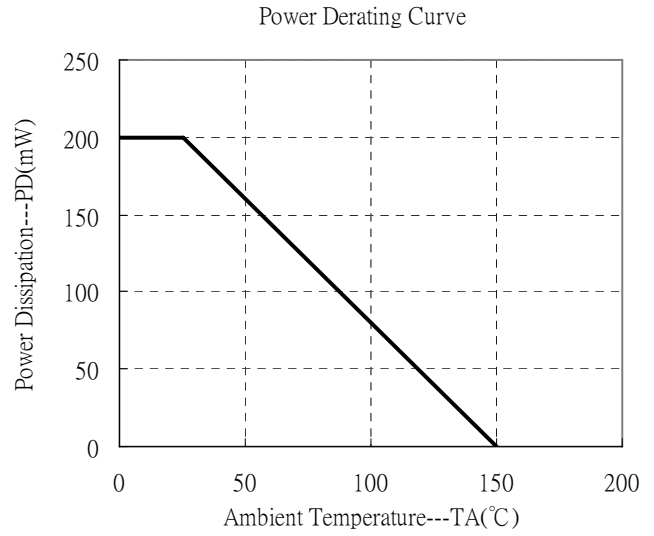
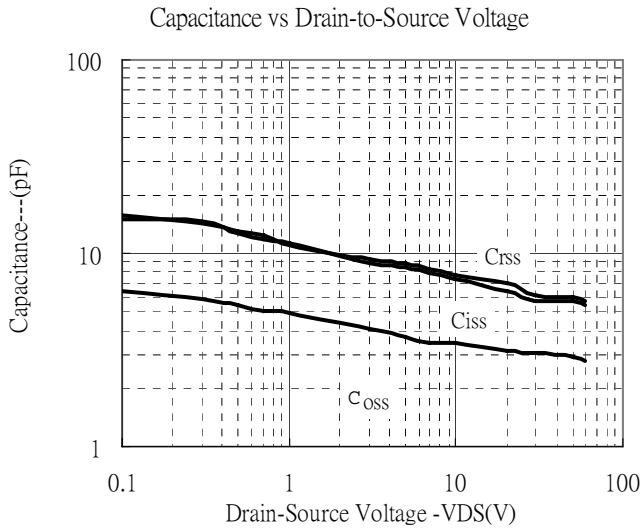


Reverse Drain Current vs Source-Drain Voltage

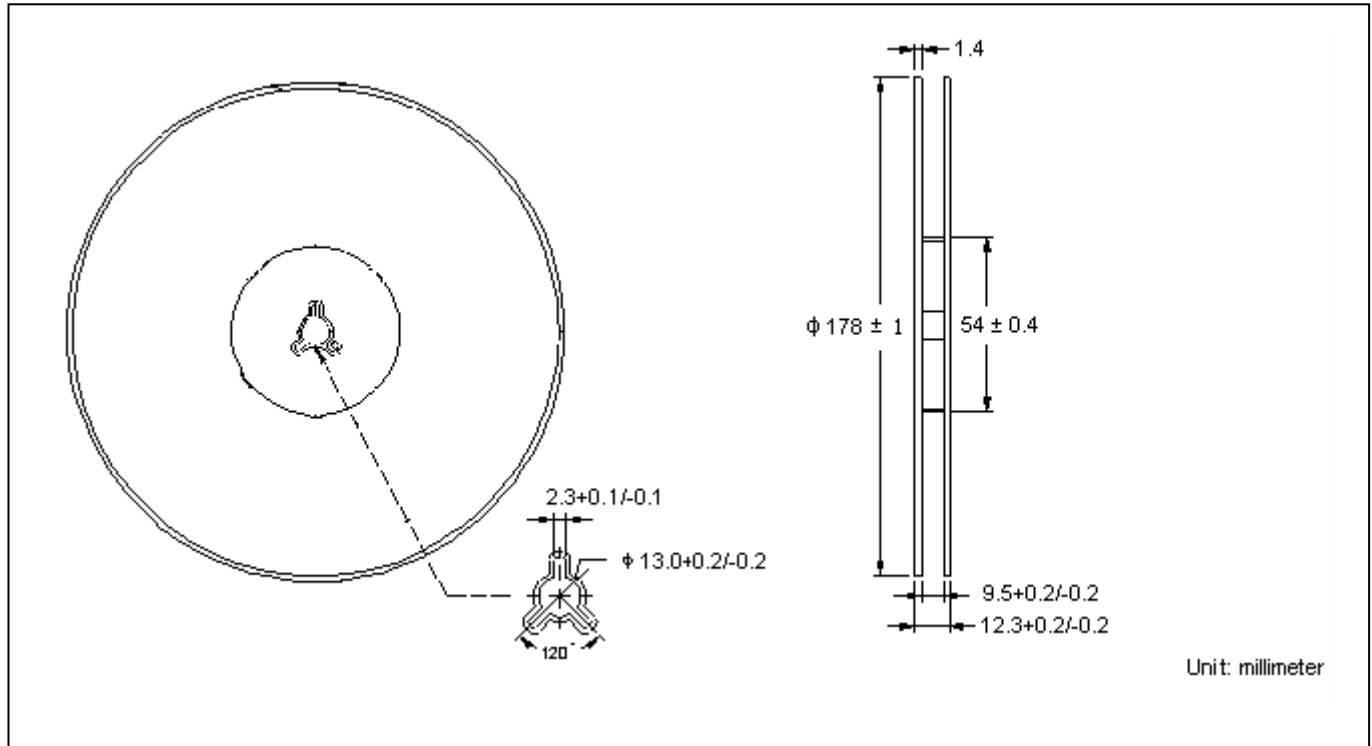




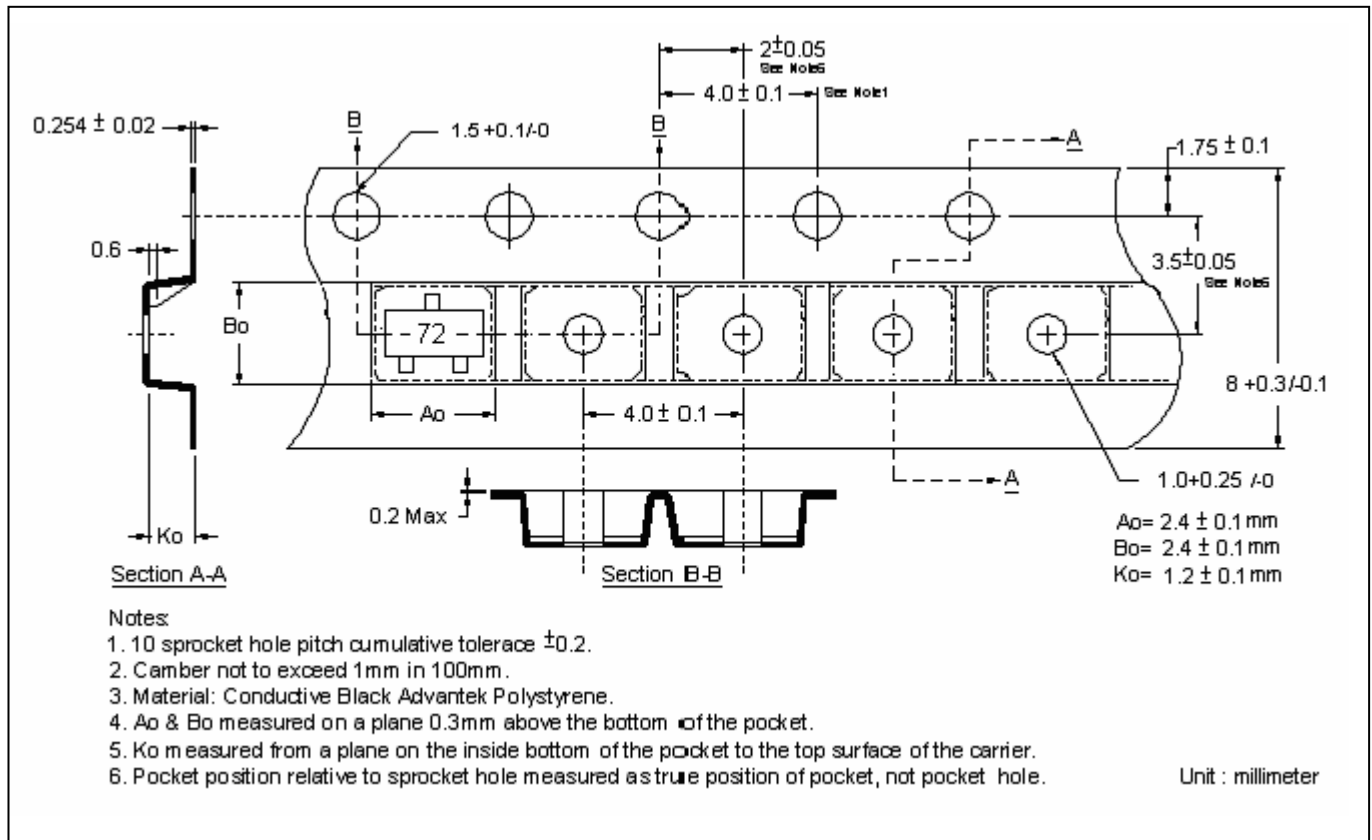
### Characteristic Curves(Cont.)



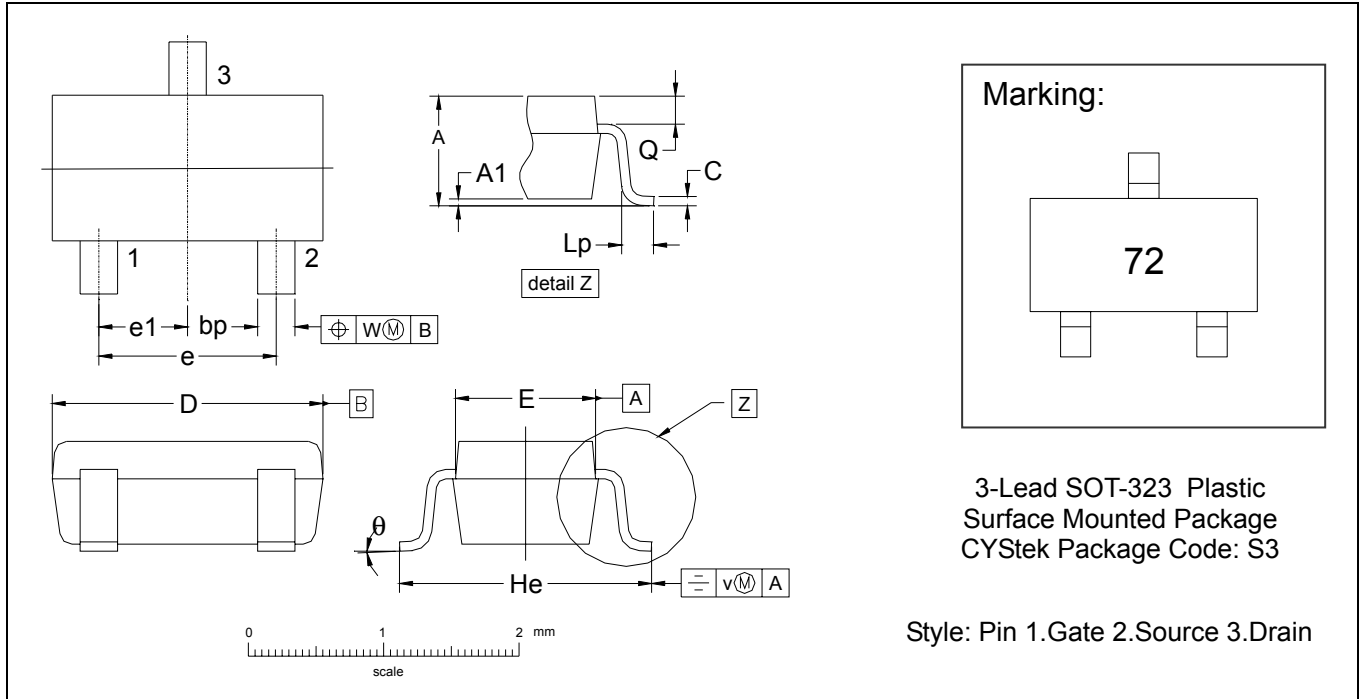
**Reel Dimension**



**Carrier Tape Dimension**



**SOT-323 Dimension**



\*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.0315	0.0433	0.80	1.10	e1	0.0256	-	0.65	-
A1	0.0000	0.0039	0.00	0.10	He	0.0787	0.0886	2.00	2.25
bp	0.0118	0.0157	0.30	0.40	Lp	0.0059	0.0177	0.15	0.45
C	0.0039	0.0098	0.10	0.25	Q	0.0051	0.0091	0.13	0.23
D	0.0709	0.0866	1.80	2.20	v	0.0079	-	0.2	-
E	0.0453	0.0531	1.15	1.35	w	0.0079	-	0.2	-
e	0.0512	-	1.3	-	θ	-	-	10°	0°

Notes: 1.Controlling dimension: millimeters.  
 2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.  
 3.If there is any question with packing specification or packing method, please contact your local CYStek sales office.

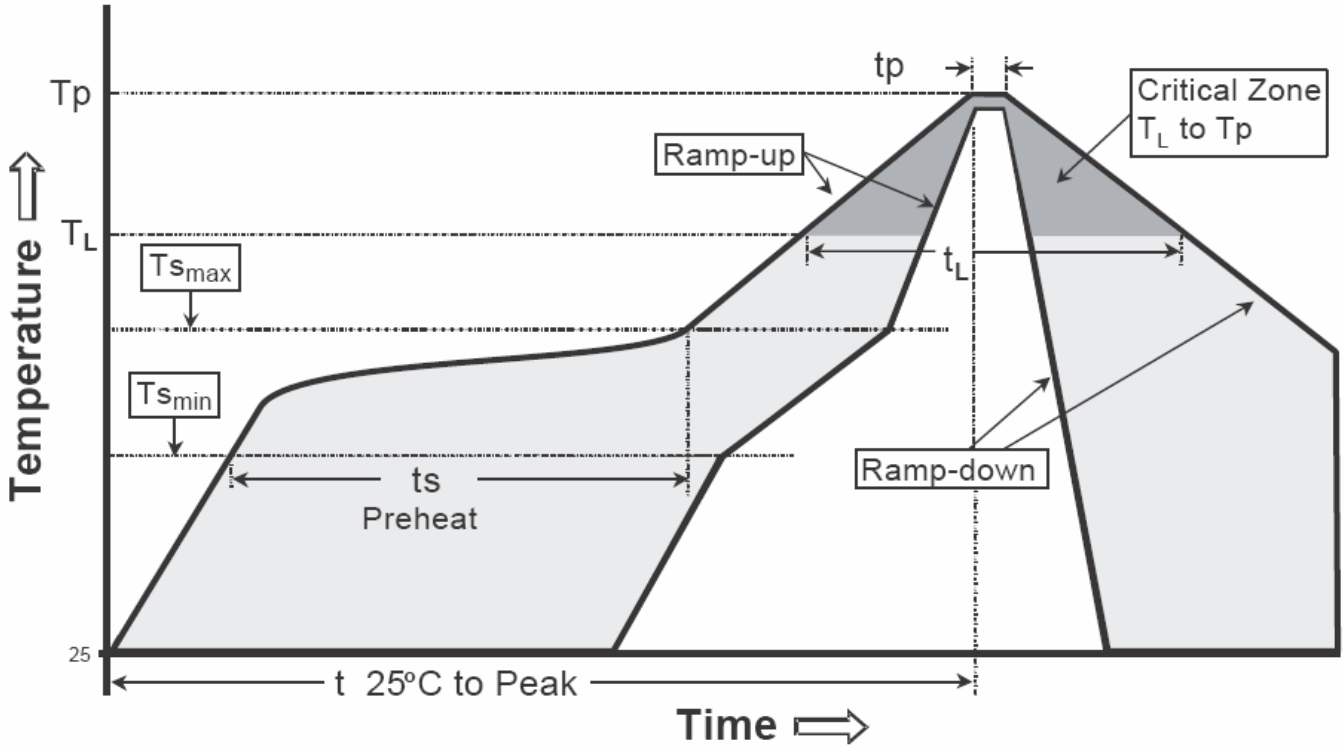
**Material:**

- Lead: 42 Alloy ; solder plating
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

**Recommended wave soldering condition**

Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

**Recommended temperature profile for IR reflow**



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T <sub>smax</sub> to T <sub>p</sub> )	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(T <sub>s min</sub> )	100°C	150°C
-Temperature Max(T <sub>s max</sub> )	150°C	200°C
-Time(t <sub>s min</sub> to t <sub>s max</sub> )	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (T <sub>L</sub> )	183°C	217°C
- Time (t <sub>L</sub> )	60-150 seconds	60-150 seconds
Peak Temperature(T <sub>P</sub> )	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature(tp)	10-30 seconds	20-40 seconds
Ramp down rate	6°C/second max.	6°C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

Note : All temperatures refer to topside of the package, measured on the package body surface.

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# ESD RELIABILITY TEST REPORT

## TEST REPORT

Company : Cystech Electronics Corp  
 Model Name : MTN7002ZHS3  
 Date Received : 2007.11.06  
 Date Tested : 2007.11.08

**TESTING LABORATORY IS ACCREDITED BY:**

IEC/IECQ 17025 certificate of independent test laboratory approval

Certificate No. : T1091

ISO 17025 accredited in respect of laboratory is approved by TAF

Certificate No. : L0835-060321

ISO 9001 certificate is approved by TUV CERT certification body of TUV NORD Cert GmbH

**WE HEREBY CERTIFY THAT:**

The test(s) shown in the attachment were conducted according to the indicating procedures. We assume full responsibility for the accuracy and completeness of these tests and vouch for the qualifications of all personnel performing them.

	Name	Signature	Date
Test Engineer	Jay Fang	Reliability Test Engineer <i>Jay Fang</i>	2007/11/06
Section Manager	Kosa Lin	Reliability Test Engineer <i>Kosa Lin</i>	2007/11/08

**Note :**

1. This report will be invalid if reproduced in whole or in part.
2. This report refers only to the specimen(s) submitted to test, and is invalid if used separately.
3. This report is ONLY valid with the examination seal and signature of this institute.
4. The tested specimen(s) will only be preserved for thirty days from the date issued, if not collected by the applicant.





**Integrated Service Technology Inc.**  
Reliability Engineering Division  
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Tel: 886-3-578-2266, Fax: 886-3-5634868  
<http://www.istgroup.com>



**No.:T1091**

Report No. : HS0711060098A

Report No. : RAC9603789-E

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## ESD RELIABILITY TEST REPORT

<b>Applicant/Department:</b> Cystech Electronics Corp		
<b>Product</b>	: MTN7002ZHS3	
<b>Testing Item</b>	: ESD-HBM	<b>Package/Pin Count:</b> SOP-3
<b>Test Method</b>	: MIL-STD-883G Method 3015.7	
<b>Failure Criteria</b>	: FOR V CHANGE AT 1 $\mu$ A $\pm$ 30%	
<b>Test Voltage</b>	: 2500V ~8000V ( $\pm$ ), Step : 250V ( $\pm$ )	

## ESD-HBM Testing Report

### Test Equipment:

KEYTEK ZAPMASTER #10-6098

### Environmental Condition of Laboratory:

Temperature: 25°C±5°C

Humidity: 55%±10% RH

### Test Condition:

D,S – G (+)

D,S – G (-)

G,S – D (+)

G,S – D (-)

D,G – S (+)

D,G – S (-)

### Test Result:

MODEL: HBM	ESD SENSITIVITY PASS : <u>±1250V</u>		V CLASS: <u>1C</u>
PIN COMBINATION	SAMPLE SIZE	PASSED VOLTS	<b>NOTE:</b> FOR EIAJ TEST NO CLASSIFICATION CLASS 0: < 250V CLASS 1A: 250V TO 499V CLASS 1B: 500V TO 999V CLASS 1C: 1000V TO 1999V CLASS 2: 2000V TO 3999V CLASS 3A: 4000V TO 7999V CLASS 3B: ≥ 8000V
D,S – G (+)	1	+1250V	
D,S – G (-)	1	-1500V	
G,S – D (+)	1	+1250V	
G,S – D (-)	1	-1250V	
D,G – S (+)	1	+1250V	
D,G – S (-)	1	-1250V	

D,S – G (+) (UNIT: V)		
Test Pin	FAIL VOLTAGE	#1
2		1500
3		2000

D,S – G (-) (UNIT: V)		
Test Pin	FAIL VOLTAGE	#1
2		-1750
3		-3500

G,S – D (+) (UNIT: V)		
Test Pin	FAIL VOLTAGE	#1
1		1500
2		PASS

G,S – D (-) (UNIT: V)		
Test Pin	FAIL VOLTAGE	#1
1		-1500
2		-1500

D,G – S (+) (UNIT: V)		
Test Pin	FAIL VOLTAGE	#1
1		1500
3		8000

D,G – S (-) (UNIT: V)		
Test Pin	FAIL VOLTAGE	#1
1		-1500
3		PASS