

Texas Instruments Military and HiRel Products

Nomenclature and Process Flows

Typical Analog Product

Example: **TLE2022AMJGBEP**

Prefix—**TLE**

SNJ	= TI Interface, MIL-PRF-38535 (QML)
SN	= Commercial Processing
TL	= TI Linear Control Circuit
TLC	= TI LinCMOS™
TLE	= TI Excalibur
TLV	= TI Linear Low Voltage
TPIC	= TI Intelligent Power
AD	= Analog Devices™ *
AM	= Advanced Micro Devices™ *
LM	= National Semiconductor™ *
LT	= Linear Technology™ *
OP	= PMI™ *
SE	= Signetics™ *
μA	= Fairchild™ *
THS	= TI High Power
TPS	= TI Power Supply

Unique Device Designator—**2022A**

A or B in last position = Upgrade

Temperature Range—**M**

M	= -55°C to 125°C (applicable to all TI prefixes except SNJ)
Q	= -40°C to 125°C
I	= -40°C to 85°C
T	= -40°C to 105°C

Package Type / Pin Count—**JG**

DA	= Plastic Small Outline Package / 28, 30, 32 or 38
FK	= Ceramic Leadless Chip Carrier / 20 or 28
GA	= Ceramic Pin Grid Array / 84
HFG	= Ceramic Flatpack / 84 or 164
J	= Ceramic DIP / 8, 14, 16, 20 or 28
JG	= Ceramic DIP / 8
U	= Ceramic Flatpack / 10
W	= Ceramic Flatpack / 14 or 16
WD	= Ceramic Flatpack / 56
L	= Ceramic Leadless Chip Carrier / 20 or 28
PHP	= Plastic Quad Flatpack PowerPad / 48
PCE	= Plastic Quad Flatpack / 144 or 160
PWP	= Plastic Power TSSOP / 14, 16, 20, 24 or 28
DW	= Plastic Widebody (30 mil) SOIC / 16, 20, 24 or 28
TCP	= Tape Carrier Package / Custom
PFB	= Plastic Quad Flatpack / 48

Process Level—**B**

Blank	= Standard Suffix, Commercial Processing
B	= MIL-PRF-38535 (QML)

Enhanced Plastic—**EP**

* = Second Source

TI-Unitrode Power Management Products

Example: **UC1825BJ883BEP**

Prefix—**TLE**

UC = Linear Integrated Circuits

UCC = BiCMOS

Part Number—**1825**

First Digit "1" = Military Temperature Range*

First Digit "2" = Industrial Temperature Range*

First Digit "3" = Commercial Temperature Range*

Optional Grades—**B**

A or B = Improved Version

Process Level—**883B**

J, JE = Ceramic DIP (300 mil and 600 mil)

L, L20 = Ceramic Leadless Chip Carrier (CLCC)

Enhanced Plastic—**EP**

* = Consult individual data sheets for specific temperature ranges on each part.

** = The "883B" designator was retained to be consistent with the original Unitrode naming convention.

Digital Signal Processors (DSPs)

Example: **SMJ320C40GBM40EP**

Prefix—**SMJ**

SM	= Commercial Processing
SMJ	= MIL-PRF-38535 (QML Class Q)
SMQ	= MIL-PRF-38535 (QML Class N)
	(Order by SMD)
SMP	= Production Prototype
SMX	= Military Preproduction
TMS	= Commercial Qualified
TMP	= Commercial Grade
SMV	= MIL-PRF-38535 QML Class V
	(Order by SMD)

320 DSP Family Designator—**320 or 32**

320 DSP Product Designator—**C40**

BC	= CMOS Boot				
C	= CMOS				
E	= CMOS EPROM				
F	= CMOS FLASH				
LC	= CMOS 3.3 V				
VC	= CMOS 1.5 V / 3.3 V				
14	= E14	50	= C50	5409	= VC5409
15	= C15	62	= C62xx	5421	= VC5421
25	= C25	64	= C64xx		
26	= C26	67	= C67xx		
30	= C30	80	= C80		
31	= C31	240	= F240		
32	= C32	2812	= F2812		
33	= VC33	5416	= VC5416		
40	= C40	549	= LC549		

Package Type / Pin Count—**GB**

JD	= CDIP
FD/FJ	= LCCC
GB/GF	= CPGA
GFA	= CFGP
GLG/GLP	= FC/CSP
HFH/HFG	= CFP
HFP	= CFP
KGD	= KGD
PCM/PQ	= QFP
GNM	= FBGA
GAD	= FC μ BGA
GJC	= FC/CSP
GJL	= FC/CSP
GLZ	= FCBGA
GDP	= LQFP
PGE	= Plastic LQFP
GGU	= BGA
GGW	= BGA Microstar
PGF	= LQFP
GHH	= PBGA

Enhanced Plastic—**EP**

Speed Designator—**GB**

12	= 120 MHz
16	= 160 MIPS (VC5416)
20	= 200 MIPS (VC5421)
33	= 33 MHz
40	= 40 MHz
50	= 500 MHz (C64xx)
60	= 60 MHz (600 MHz C6415)
60	= 60 MIPS (C54x)
66	= 66 MHz
10	= 100 MIPS (C54x)
14	= 140 MHz
15	= 150 MHz
16	= 167 MHz
17	= 175 MHz
20	= 200 MHz
120	= 120 MFLOPS (VC33)
150	= 150 MFLOPS (VC33)

Temperature Range—**M**

M	= -55°C to 125°C
A	= -40°C to 105°C (C6000)
L	= 0°C to 70°C
W	= -55°C to 115°C
S	= Special Per datasheet
Blank	= 25°C

* = Not all speed, package, process, temperature combinations are available.

First-In, First-Out Products (FIFOs)

Example: SN54ABT36148HFPEP

Prefix—SN

SN = Commercial Processing

SNJ = MIL-PRF-38535 (QML) (Class Q)

Military Temperature—54

54 = -55°C to 125°C

74 = 0°C to 70°C

Technology—ABT

ABT = Advanced BiMOS

ACT = Advanced CMOS

LS = Low-Power Schottky

HC = High Speed CMOS (CMOS Input Levels)

HCT = High Speed CMOS (TTL Input Levels)

Circuit Designator—3614

J, JE = Ceramic DIP (300 mil and 600 mil)

L, L20 = Ceramic Leadless Chip Carrier (CLCC)

Package Type—3614

J = CDIP

HFP = CFP

KGD = KGD

PCB/PN = QFP

FK = LCCC

GB = BGA Microstar

Enhanced Plastic—EP

TI Acquired Harris Logic

Example: **CD4XXXXXX**

Prefix—CD

Device Function (up to 5 digits)—**4XXXX**

Supply Voltage—XX

A = 2 V Max

B = 18 V Max

UB = 18 V Max Unbuffered

Package Designation—X

F = Ceramic Dual In-Line
Package (CDIP)

K = Ceramic Flatpack

D = Metal Seal CDIP

Process Levels—X

3 = Mil Temp

Commercial

Processing

3A = MIL-PRF-38535
(QML)

B = MIL-M-38510
Electrical
(QPL)

Logic

Example: **SNJ54ABTH162245WDEP**

Prefix—**SNJ**

SNJ = MIL-PRF-38535 (QML)
SN = Commercial Processing
SNV = MIL-PRF-38535 QML Class V
(Order by SMD)

Type—**54**

Technology—**ABT**

No designator = TTL
ALS/AS = Advanced Low-Power Schottky Advanced Schottky
AHC/AHCT = Advanced High Speed CMOS
HC/HCT = High Speed CMOS
BCT = BiCMOS
AC/ACT = Advanced CMOS
ABT = Advanced BiCMOS
LVC = Low Voltage CMOS
LVTH = Low Voltage Advanced CMOS w/ Bus Hold
CDC = Clock Distribution Circuit
CBT = Crossbar Bus Switch
GTL = Gunning Transceiver Logic
FCT = Fast CMOS Technology
F = FAST

Special Features—**H**

D = Level Shifting Diode (CBTD)
H = Bus Hold (LVTH)

Bus/Scan Options—**16**

8 = SCOPE/JTAG
16 = Widebus
18 = SCOPE/JTAG Widebus
32 = Widebus+

Options—**2**

2 = Series-Damping Resistors on Outputs

Device Function—**245**

Package Type—**WD**

PZ = LQFP
PW = TSSOP
DW = SOIC
DL = SSOP
D = SOIC
DB = TSSOP
DGG = TSSOP
DCK = SOP
GQL = BGA Microstar Junior
ZQL = BGA Microstar Junior
J,JT = CDIP

Enhanced Plastic—**EP**

W/WD = Ceramic Flatpack
FK = Leadless Ceramic Chip Carrier
HV, HT, HFP = Ceramic Quad Flatpack
GB = Pin Grid Array (PGA)

Programmable Logic

Example: **TIBPAL16L8-10MJB**

Prefix—**TIB**

TIB = IMPACT™

Product Family Designator—**PAL**

Number of Array Inputs—**16**

Output Configuration Designator—**L**

L = Active Low

R = Registered

V = Variable (programmable)

Number of Outputs in Designated Configuration—**8**

Performance Designator—**10**

-7 = 7 ns propagation delay

-10 = 10 ns propagation delay

-12 = 12 ns propagation delay

-15 = 15 ns propagation delay

-20 = 20 ns propagation delay

-25 = 25 ns propagation delay

-30 = 30 ns propagation delay

A = Standard power

A-2 = Half power

Temperature Range—**M**

M = -55°C to 125°C

C = 0°C to 70°C

Package Type—**J**

J, JT = Ceramic Dual In-Line Package (CDIP)

FK = Leadless Ceramic Chip Carrier (LCCC)

W = Ceramic Flatpack

Processing—**B**

Blank = Commercial processing

B = MIL-PRF-38535 (QML)
(Class Q)

DSCC Standard Microcircuit Drawing (SMD)

Example: **5962-85155** or **8200501MFA***

Drawing Number—**5962-85155** or **82005**

Device—**01**

Device Structure—M

- M = Vendor self-certification to the requirements for MIL-STD-883 compliant
- Q = Certification and qualification to the MIL-PRF-38535 (Class Q)
- V = Certification and qualification to the MIL-PRF-38535 (Class V)

Package—F

- | | | |
|------------------------------------|--------------------------|---------------------|
| A = 14-pin Flatpack (1/4" x 1/4") | I = 10-pin Flatpack | S = 20-pin Flatpack |
| B = 14-pin Flatpack (3/16" x 1/4") | J = 24-pin DIP | V = 18-pin DIP |
| C = 14-pin DIP | K = 24-pin Flatpack | W = 22-pin DIP |
| D = 14-pin Flatpack | L = 24-pin DIP (300 mil) | 2 = 20-pad LCC |
| E = 16-pin DIP | M = 12-pin Can | 3 = 28-pad LCC |
| F = 16-pin Flatpack | P = 8-pin DIP | X = Other packages |
| G = 8-pin Can | Q = 40-pin DIP | Y = Other packages |
| H = 10-pin Flatpack | R = 20-pin DIP | |

Lead Finish—A*

- A* = Solder Dip
- C = Gold Plate
- D = Paladium

DSCC JAN Slash Sheet

Example: **JM38510/00104BCA***

Process Level—**JM38510/**

Device/Slash Sheet—**00104**

Device Class—**B**

Package Type—**C**

A = 14-pin Flatpack (1/4" x 1/4")	I = 10-pin Flatpack	S = 20-pin Flatpack
B = 14-pin Flatpack (3/16" x 1/4")	J = 24-pin DIP	V = 18-pin DIP
C = 14-pin DIP	K = 24-pin Flatpack	W = 22-pin DIP
D = 14-pin Flatpack	L = 24-pin DIP (300 mil)	2 = 20-pad LCC
E = 16-pin DIP	M = 12-pin Can	3 = 28-pad LCC
F = 16-pin Flatpack	P = 8-pin DIP	X = Other packages
G = 8-pin Can	Q = 40-pin DIP	Y = Other packages
H = 10-pin Flatpack	R = 20-pin DIP	

* Solder dip lead finish normally supplied by TI. Lead finish options must be specified by ordering the DSCC SMD number.

Lead Finish—**A***

A* = Solder Dip

C = Gold Plate

D = Palladium

Process Flows

Things to Consider

Several process flows are available for TI Military Products. The flows are typical and may vary depending on changes to applicable military standards, such as MIL-PRF-38535.

QML products, processed to MIL-PRF-38535 level Q, are offered in three different types:

JM38510

Processed under MIL-PRF-38535 and electrically tested to the JAN slash sheet

DSCC/SMD

Processed under MIL-PRF-38535 and electrically tested to the DSCC standard microcircuit drawing.

— SMQ - Processed under MIL-PRF - 38535 Class N (Order by SMD)

— SMV - Processed under MIL-PRF - 38535 Class V (Order by SMD)

SNJ/SMJ

Processed under MIL-PRF-38535 (Class Q) and electrically tested to the TI data sheet. All QML products are symbolized with the Q quality designator on the top side.

Enhanced Plastic

Testing and screening of EP products is performed in accordance with the TI data sheet for that device. Configuration control is performed by Texas Instruments. TI processes EP products per "best commercial practices" to the TI internal baseline flow. Processing and screening is documented in the TI Quality System Manual and is in compliance with ISO9001.

Process Flows

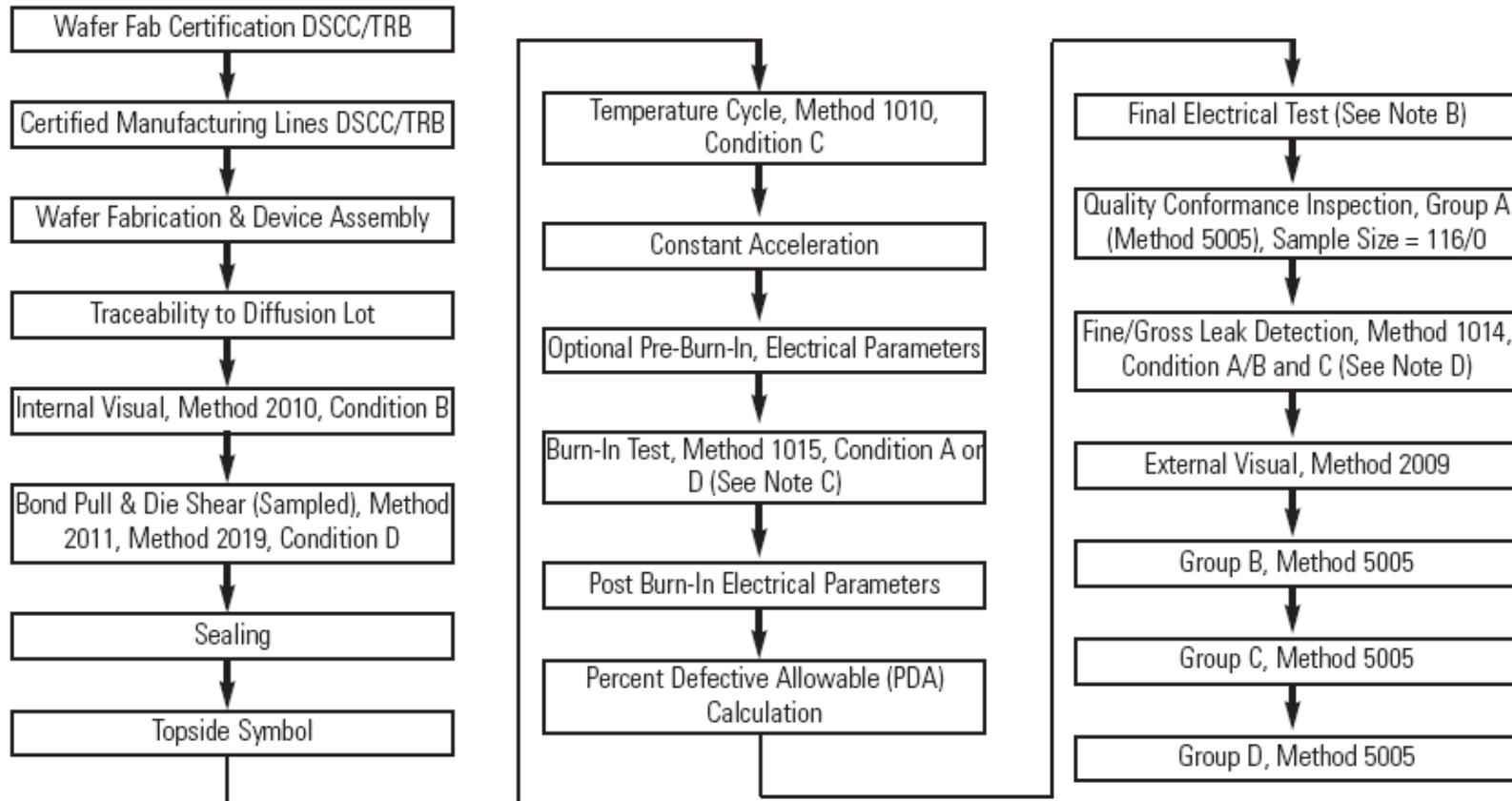
Process Flows (See Note A)	Description
DSCC/SMD	Standard Microcircuit Drawing products processed to a MIL-PRF-38535 flow. Electricals controlled by SMD/DSCC.
SNJ/SMJ	Products processed to MIL-PRF-38535 Level B for military applications. Electricals controlled by current TI data sheet.
SN/SM	Commercial level ceramic processing. Test flow defined in this section. Electricals defined by current TI data sheet but may not be production tested.
SMX*/SNX*	Experimental products assembled and tested by Military Products prior to qualification. No minimum screening or testing required. Electricals controlled by current TI data sheet.
SMP*/SNP*	Prototype devices representative of production material with military temperature range testing. Shipped prior to completion of qualification testing. Electricals controlled by current TI data sheet.
JAN	Processed per QML MIL-PRF-38535 flow. Electricals controlled by JAN slash sheet.
EP	Processed in compliance with ISO9001. Testing and screening performed in accordance with TI data sheet.

* These devices have not met or completed TI Military Semiconductors internal qualification requirements. These devices are for prototyping purposes only and standard TI warranties do not apply. Supply of these devices does not constitute a commitment by TI to release them to production.

NOTE A: While TI offers SCDs, it is not the standard or preferred method of procurement.

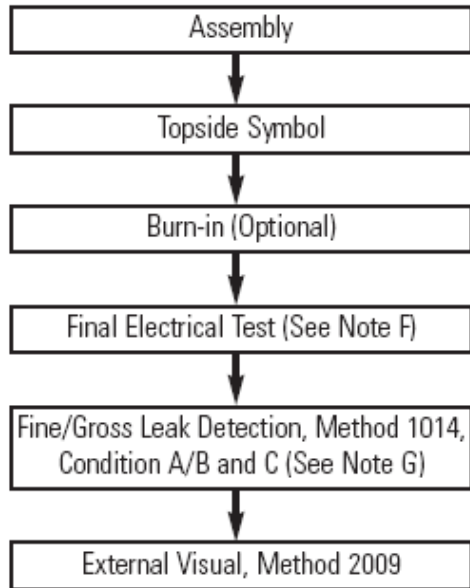
Process Flows

QML Processing Flow Covering DSCC, SMD, SNJ, SMJ and JAN (See Note A)



Process Flows

SN/SM Processing Flow



NOTE A: Per MIL-PRF-38535, if sufficient quality and reliability data is available, the manufacturer, through the QML program and the Technical Review Board may modify, substitute or delete tests.

NOTE B: According to device type, electrical parameters are defined by the slash sheet, DSCC/SMD, or TI data sheet and Method 5004.

NOTE C: Condition A or D at manufacturer's option

NOTE D: Ceramic packages only

NOTE E: Lead finish options must be specified by ordering the DSCC SMD number

NOTE F: Contact the Product Information Center (PIC) for detailed test information.

NOTE G: Ceramic packages only.

NOTE H: Lead finish may vary. For example, ceramic PGA and ceramic QFP packages may be gold finish. Contact the PIC for detailed information.

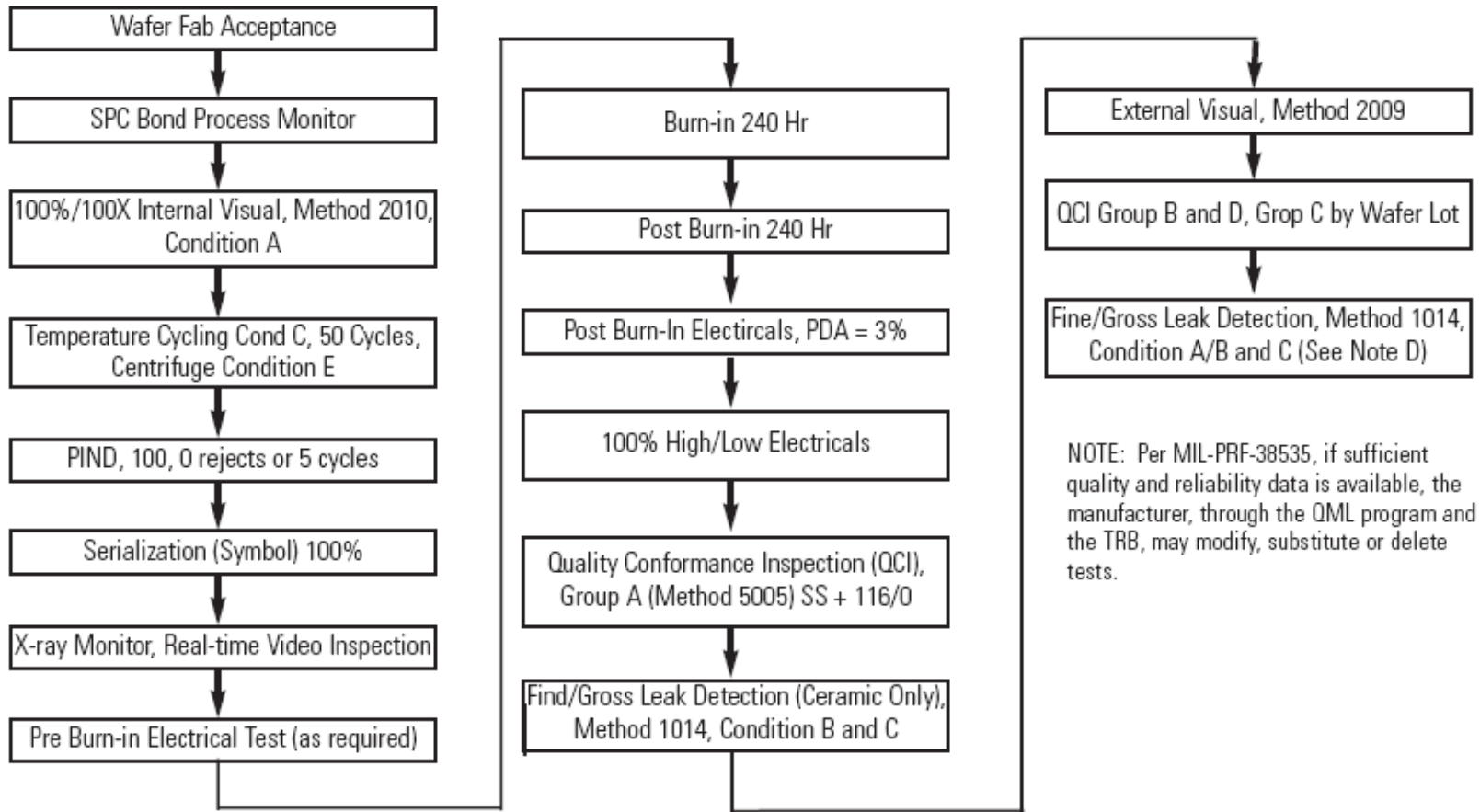
ESD Markings (Optional)

MIL-PRF-38535 ESD Class Designation	ESD Voltage Range	Marking
1	0 - 1999 V	1 Triangle
2	2000 - 3999 V	2 Triangles
3	4000 V	No Triangles

¥ As referred to above, ESD marking is optional.

Process Flows

Offshore Class V Process Flow (Texas Instruments/Unitrode)




Process Flows

Symbolization [□]

YQBF† YYWLLZ§ USA	
JM38510/30003BCA	
¥	Q* 

Example: JANB 54LS161A

Order As: JM38510/3003BCA

SNJ54LS161AJ	00XXY 
7600801EA#	
YQBF†	THAILAND^
¥	Q*


Example: SNJ 54LS161A

Order As: SNJ54LS161AJ or 7600801EA

SN54LS161AJ	00XXY
	
¥	THAILAND^


Example: SN 54LS161A

Order As: SN54LS161AJ

SNJ54S381J	00XXY 
¥	THAILAND^

Example: SNJ With No SMD

Order As: SNJ54S381J

SMJ	YQBF 
320C30GBM40	
5962-9052604MXA	
¥	00XXY Q*

Example: SMJ 320C30GBM40

Order As: SMJ320C30GBM40
or 5962-9052604MXA

YQBF†	
UCC1806JQMLV	
5962-9457501VEA	
YYWLLZ§ THAILAND^	
¥	Q*

Example: UCC 1806JQMLV

Order As: 5962-9457501VEA

□ TI bug is optional

¥ = ESD marking is optional

† YQ = diffusion date,

B = die revision

F = wafer fab code (optional)

§ YYWW = seal date

LL = lot window

Z = B/I split lot

* Q marking denotes QML-compliant product

Where TI is an approved source

^ Country of origin may be located on package underside.

For more information

www.ti.com/hire1

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products

Audio	www.ti.com/audio
Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DLP® Products	www.dlp.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
OMAP Applications Processors	www.ti.com/omap
Wireless Connectivity	www.ti.com/wirelessconnectivity

Applications

Automotive and Transportation	www.ti.com/automotive
Communications and Telecom	www.ti.com/communications
Computers and Peripherals	www.ti.com/computers
Consumer Electronics	www.ti.com/consumer-apps
Energy and Lighting	www.ti.com/energy
Industrial	www.ti.com/industrial
Medical	www.ti.com/medical
Security	www.ti.com/security
Space, Avionics and Defense	www.ti.com/space-avionics-defense
Video and Imaging	www.ti.com/video

TI E2E Community

e2e.ti.com