RoHS Compliant

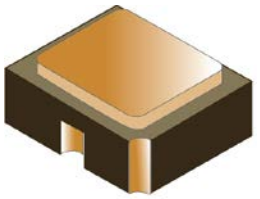
NPN Silicon Switching Transistor

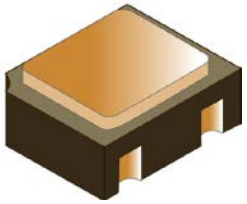
Qualified per MIL-PRF-19500/399

Qualified Levels:
JAN, JANTX, AND JANTXV

DESCRIPTION

This 2N3960UB epitaxial planar transistor is military qualified up to the JANTXV level for high-reliability applications. It features a low profile ceramic UB package. This device is also available in a thru-hole TO-18 package.





UB Package

Important: For the latest information, visit our website http://www.microsemi.com.

FEATURES

- Surface mount equivalent of JEDEC registered 2N3960 number
- JAN, JANTX, and JANTXV qualifications are available per MIL-PRF-19500/366. (See part nomenclature for all available options.)
- RoHS compliant

Also available in:

TO-18 package
(leaded)
2N3960

APPLICATIONS / BENEFITS

- General purpose transistors for medium power applications requiring high frequency switching
- Low profile ceramic package
- Lightweight
- Military and other high-reliability applications

MAXIMUM RATINGS @ T_C = +25 ºC unless otherwise noted

Parameters / Test Conditions	Symbol	Value	Unit
Junction & Storage Temperature Range	T_J, T_{stg}	-65 to +200	°C
Collector-Emitter Voltage	V_{CEO}	12	V
Collector-Base Voltage	V_{CBO}	20	V
Emitter-Base Voltage	V_{EBO}	4.5	V
Total Power Dissipation @ T_A = +25 °C (1)	P_T	400	mW

Notes: 1. Derate linearly 2.3 mW/°C above T_A = +25 °C

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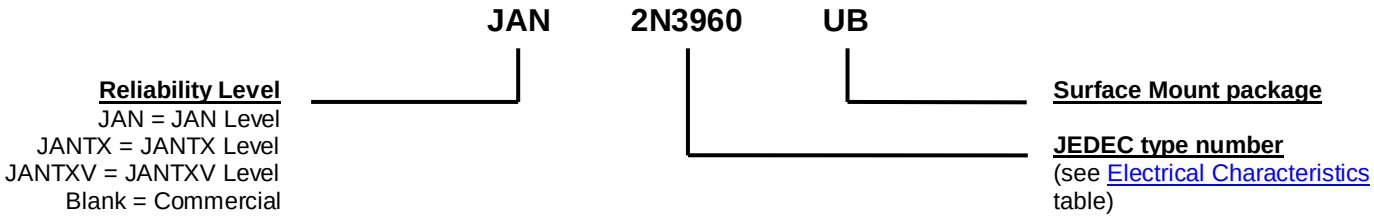
MECHANICAL and PACKAGING

- CASE: Ceramic with kovar lid
- TERMINALS: Gold plating over nickel under plate.
- MARKING: Part number, date code, manufacturer's ID
- TAPE & REEL option: Standard per EIA-418D. Consult factory for quantities.
- WEIGHT: Less than 0.04 grams
- See Package Dimensions on last page.

PART NOMENCLATURE



SYMBOLS & DEFINITIONS

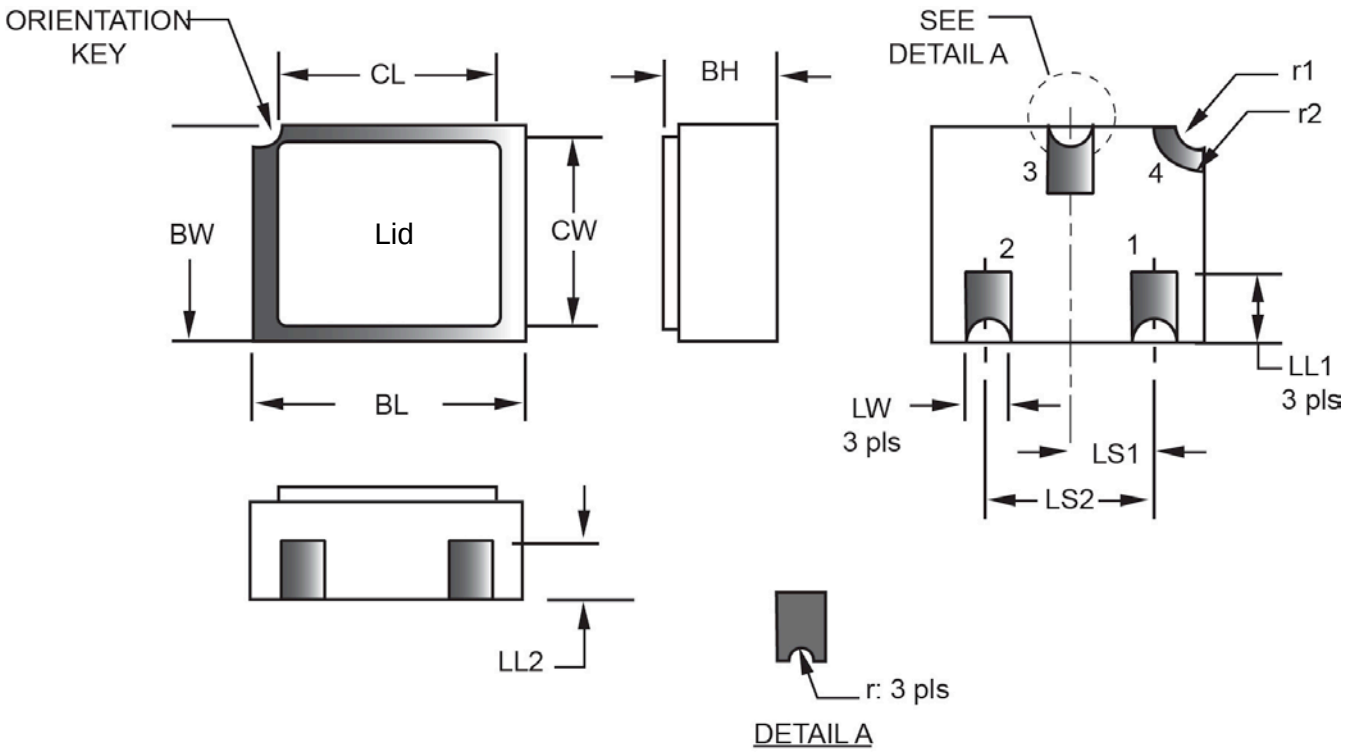
Symbol	Definition
I_B	Base current: The value of the dc current into the base terminal.
I_C	Collector current: The value of the dc current into the collector terminal.
V_{CB}	Collector-base voltage: The dc voltage between the collector and the base.
V_{CBO}	Collector-base voltage, base open: The voltage between the collector and base terminals when the emitter terminal is open-circuited.
V_{CE}	Collector-emitter voltage: The dc voltage between the collector and the emitter.
V_{CEO}	Collector-emitter voltage, base open: The voltage between the collector and the emitter terminals when the base terminal is open-circuited.
V_{CC}	Collector-supply voltage: The supply voltage applied to a circuit connected to the collector.
V_{EB}	Emitter-base voltage: The dc voltage between the emitter and the base
V_{EBO}	Emitter-base voltage, collector open: The voltage between the emitter and base terminals with the collector terminal open-circuited.

ELECTRICAL CHARACTERISTICS @ T_A = +25 °C, unless otherwise noted

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage I_C = 10 μA, pulsed	$V_{(BR)CEO}$	12		V
Collector-Base Cutoff Current V_{CB} = 20 V	I_{CBO}		10	μA
Emitter-Base Cutoff Current V_{EB} = 4.5 V	I_{EBO}		10	μA
Collector-Emitter Cutoff Current V_{CE} = 10 V, V_{EB} = 0.4 V V_{CE} = 10 V, V_{EB} = 2.0 V	I_{CEX1} I_{CEX2}		1 5	μA nA
ON CHARACTERISTICS (1)				
Forward-Current Transfer Ratio I_C = 1.0 mA, V_{CE} = 1 V I_C = 10 mA, V_{CE} = 1 V I_C = 30 mA, V_{CE} = 1 V	h_{FE}	40 60 30	300	
Collector-Emitter Saturation Voltage I_C = 1.0 mA, I_B = 0.1 mA I_C = 30 mA, I_B = 3.0 mA	$V_{CE(sat)}$		0.2 0.3	V
Base-Emitter Saturation Voltage I_C = 1.0 mA, V_{CE} = 1.0 V I_C = 30 mA, V_{CE} = 1.0 V	V_{BE}		0.8 1.0	V
DYNAMIC CHARACTERISTICS				
Forward Current Transfer Ratio, Magnitude I_C = 5.0 mA, V_{CE} = 4 V, f = 100 MHz I_C = 10 mA, V_{CE} = 4 V, f = 100 MHz I_C = 30 mA, V_{CE} = 4 V, f = 100 MHz	$\lvert h_{fe} \rvert$	13 14 12		
Output Capacitance V_{CB} = 4 V, I_E = 0, 100 kHz ≤ f ≤ 1 MHz	C_{obo}		2.5	pF
Input Capacitance V_{EB} = 0.5 V, I_C = 0, 100 kHz ≤ f ≤ 1.0 MHz	C_{ibo}		2.5	pF

(1) Pulse Test: pulse width = 300 μs, duty cycle ≤ 2.0%

PACKAGE DIMENSIONS



Symbol	Dimensions				Note	Symbol	Dimensions				Note
	Inch		Millimeters				Inch		Millimeters		
	Min	Max	Min	Max			Min	Max	Min	Max	
BH	0.046	0.056	1.17	1.42		**LS_1**	0.035	0.040	0.89	1.02	
BL	0.115	0.128	2.92	3.25		**LS_2**	0.071	0.079	1.80	2.01	
BW	0.085	0.108	2.16	2.74		**LW**	0.016	0.024	0.41	0.61	
CL	-	0.128	-	3.25		**r**	-	0.008	-	0.203	
CW	-	0.108	-	2.74		**r_1**	-	0.012	-	0.305	
LL_1	0.022	0.038	0.56	0.97		**r_2**	-	0.022	-	0.559	
LL_2	0.017	0.035	0.43	0.89							

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for information only.
3. Hatched areas on package denote metallized areas.
4. Lid material: Kovar
5. Pad 1 = Base, Pad 2 = Emitter, Pad 3 = Collector, Pad 4 = Shielding connected to the lid.
6. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.