REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Page 2, 1.3: Change Θ_{JA}. Page 6, 4.2a(2) and 4.3.2b(2): Change T_A to T_C for burn-in and life test. Pages 7 and 8, table I: add end-point electricals for V_{IH}. Add footnote 2/.	86-10-30	W. Heckman
B	Made tecnical changes to table I. Upadated drawing format with editorial changes. Added device types 02 through 07. Added cases Y, Z, U, and T. Changed to reflect MIL-H-38534 processing. Device type 01 inactive for new design. Added current CAGE code 67268 to sheet 1 .	90-02-09	W. Heckman
C	Add device type 08. Made technical changes to table I. Change dimensions for case outline Y. Change dimensions for case outline U. Editorial changes throughout.	94-01-14	K. Cottongim

THE ORIGINAL FIRST PAGE OF THIS DRAWING HAS BEEN REPLACED.

CURRENT CAGE CODE 67268

REV																			
SHEET																			
REV	C	C	C	C	C	C													
SHEET	15	16	17	18	19	20													

REV STATUS OF SHEETS															
REV	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13	14	

PMIC N/A

STANDARDIZED MILITARY DRAWING

THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE

AMSC N/A

PREPARED BY
Donald R. Osborne

CHECKED BY
D.A. DiCenzo

APPROVED BY
N.A. Hauck

DRAWING APPROVAL DATE
86-07-30

REVISION LEVEL
C

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUIT, DIGITAL, SINGLE CHANNEL DRIVER-RECEIVER, HYBRID

SIZE	CAGE CODE	5962-86049
A	14933	

SHEET 1 OF 20

DESC FORM 193
JUL 91

5962-E702-92

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

1. SCOPE

1.1 Scope. This drawing describes device requirements for class H hybrid microcircuits to be processed in accordance with MIL-H-38534.

1.2 Part or Identifying Number (PIN). The complete PIN shall be as shown in the following example:

5962-86049	01	X	X
Drawing number	Device type (see 1.2.1)	Case outline (see 1.2.2)	Lead finish per MIL-H-38534

1.2.1 Device type(s). The device type(s) shall identify the circuit function as follows:

Device type	Generic number	Circuit function
01	BUS-63105	Single channel driver-receiver
02	BUS-63105II, BUS-63106II	Low power, single channel driver-receiver
03	ARX2402	Single channel driver-receiver
04	ARX3402	Low power, single channel driver-receiver
05	CT-1487M, BUS-8553	Single channel driver-receiver
06	NHI-1509	Single channel driver-receiver
07	FC155361	Single channel driver-receiver
08	FC155362	Single channel driver-receiver

1.2.2 Case outline(s). The case outline(s) shall be as designated in MIL-STD-1835 and as follows:

Outline letter	Descriptive designator	Terminals	Package style
X	See figure 1	24	Dual-in-line package
Y	See figure 1	24	Dual-in-line package
Z	See figure 1	24	Dual-in-line package
U	See figure 1	24	Dual-in-line package
T	See figure 1	24	Flat package

1/ Receiver standby low, compatible with manchester encoder-decoder described in SMD 78029.
2/ Receiver standby high, compatible with Smith's manchester encoder-decoder.

1.3 Absolute maximum ratings. 1/

Supply voltage range:	
V_{CC} (device types 01, 03, 04, 05, 06, 07, and 08	-0.3 V dc to +18 V dc
V_{EE} (device types 01, 02, 03, 04, 05, 07, and 08	+0.3 V dc to -18 V dc
V_{CC1}	-0.3 V dc to +7 V dc
Logic input voltage range	-0.3 V dc to V_{CC1}
Receiver differential voltage	40 Vp-p
Receiver common mode voltage range	-10 V dc to +10 V dc
Driver peak output current	200 mA
Power dissipation (P_D) at +125°C:	
Device types 01, 05, 07, and 08	4 W
Device type 02	2.5 W
Device type 03	2.2 W
Device type 04	1.6 W
Device type 06	0.585 W
Storage temperature range	-65°C to +150°C
Lead temperature (soldering, 10 seconds)	+300°C
Junction temperature (T_J)	+160°C
Thermal resistance, junction-to-case (Θ_{JC}):	
Device types 01, 06, 07, and 08	8.8°C/W
Device type 02	7.0°C/W
Device type 03	47.2°C/W
Device type 04	88°C/W
Device type 05	60°C/W
Thermal resistance, junction to ambient (Θ_{JA}):	
Device types 01, 06, 07, and 08	38.8°C/W
Device type 02	37.0°C/W
Device type 03	77.2°C/W
Device type 04	110°C/W
Device type 05	80°C/W

1.4 Recommended operating conditions.

Supply voltage range:	
V_{CC} (device types 01, 03, 04, 05, 06, 07, and 08	+14.25 V dc to +15.75 V dc
V_{EE} (device types 01, 02, 03, 04, 05, 07, and 08	-14.25 V dc to -15.75 V dc
V_{CC1}	+4.5 V dc to +5.5 V dc
Logic input voltage range	0 V dc to +5.0 V dc
Receiver differential voltage	30 Vp-p
Receiver common mode voltage range	-5.0 V dc to +5.0 V dc
Driver peak output current:	
Device types 01, 03, 04, 05, 06, 07, and 08	180 mA
Device type 02	160 mA
Serial data rate	1.0 MHz maximum
Junction temperature (T_J)	+150°C maximum
Case operating temperature range (T_C)	-55°C to +125°C

1/ Stresses above the absolute maximum rating may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.

2. APPLICABLE DOCUMENTS

2.1 Government specification and standards. Unless otherwise specified, the following specification and standards of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this drawing to the extent specified herein.

SPECIFICATION

MILITARY

MIL-H-38534 - Hybrid Microcircuits, General Specification for.

STANDARDS

MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.
MIL-STD-1835 - Microcircuit Case Outlines.

HANDBOOK

MILITARY

MIL-HDBK-1553 - Multiplex Application Handbook.

(Copies of the specification and standards required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing shall take precedence.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with MIL-H-38534 and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-H-38534 and herein.

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.2 herein.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 2.

3.2.3 Waveforms. The waveforms shall be as specified on figure 3.

3.3 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in table I and shall apply over the full specified operating temperature range.

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table I.

3.5 Marking. Marking shall be in accordance with MIL-H-38534. The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked as listed in QML-38534 (see 6.6 herein).

3.6 Manufacturer eligibility. In addition to the general requirements of MIL-H-38534, the manufacturer of the part described herein shall maintain the electrical test data (variables format) from the initial quality conformance inspection group A lot sample, produced on the certified line, for each device type listed herein. The data should also include a summary of all parameters manually tested, and for those which, if any, are guaranteed. This data shall be maintained under document revision level control by the manufacturer and be made available to the preparing activity (DESC-EC) upon request.

3.7 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in QML-38534 (see 6.6 herein). The certificate of compliance submitted to DESC-EC prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-H-38534 and the requirements herein.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ $-55°C \le T_C \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Receiver							
Input level	V_I	Differential input, pin 15 to pin 16 2/	4,5,6	All	40		Vp-p
Input common mode voltage range	V_{ICM}	Independent of xfmr or in accordance with 2/ MIL-HDBK-1553	4,5,6	All	-5	+5	V(pk)
Output low voltage	V_{OL}	I_{OL} = 16 mA	1,2,3	01,02		0.5	V
		I_{OL} = 4 mA		03,04,05, 06,07,08			
Output high voltage	V_{OH}	I_{OH} = -0.4 mA	1,2,3	01,03,04, 05,06,07,08	2.5		V
				02	2.4		
Transmitter							
Input low voltage	V_{IL}	3/	1,2,3	All		0.7	V
Input high voltage	V_{IH}	3/	1,2,3	All	2		V
Input low current	I_{IL}	V_{IL} = 0.4 V	1,2,3	01,03,05, 07,08	-1.6		mA
				02	-0.72	0.04	
				04,06	-0.4		
Input high current	I_{IH}	V_{IH} = 2.7 V	1,2,3	01,03,04, 05,06,07,08		0.04	mA
				02	-0.72	0.04	
Output voltage	V_O	Across 35Ω load	1,2,3	All	6	9	Vp-p
Output noise voltage	V_{ON}	Across 35Ω load	4,5,6	All		10	mVp-p

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ $-55°C \le T_C \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Receiver strobe							
Input low voltage	V_{SIL}	3/	1,2,3	All		0.7	V
Input high voltage	V_{SIH}	3/ in accordance with 2/ MIL-HDBK-1553	1,2,3	All	2		V
Input low current	I_{SIL}	V_{SIL} = 0.4 V	1,2,3	01,05,07,08	-1.6		mA
				02	-0.72	0.4	
				03,06	-0.8		
				04	-0.4		
Input high current	I_{SIH}	V_{SIH} = 2.7 V	1,2,3	01,03,04, 05,06,07,08		0.04	mA
				02	-0.72	0.04	
Transmitter inhibit							
Input low voltage	V_{IIL}	3/	1,2,3	All		0.7	V
Input high voltage	V_{IIH}	3/	1,2,3	All	2		V
Input low current	I_{IIL}	V_{SIL} = 0.4 V	1,2,3	01,03,05, 07,08	-1.6		mA
				02	-0.72	0.04	
				04,06	-0.4		
Input high current	I_{IIH}	V_{SIH} = 2.7 V	1,2,3	01,03,04, 05,06,07,08		0.04	mA
				02	-0.72	0.04	

See footnotes at end of table.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ $-55°C \le T_C \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Power supply							
Total current	I_{CC}-SB	(Standby mode)	1,2,3	01,07,08		50	mA
				03		40	
				04		1	
				05,06		25	
	I_{EE}-SB	(Standby mode)		01,07,08		50	
				02,03		30	
				04		16.5	
				05		35	
	I_{CC1}-SB	(Standby mode)		01,07,08		35	
				02,05		45	
				03		20	
				04,06		30	
	I_{CC}-25	(25% duty cycle into 35Ω load)	4,5,6	01,07,08		65	
				03		90	
				05,06		75	
				04		55	
	I_{EE}-25	(25% duty cycle into 35Ω load)		01,07,08		95	
				02 2/		80	
				03		30	
				04		21	
				05		35	
	I_{CC1}-25	(25% duty cycle into 35Ω load)		01,07,08		35	
				02,05		45	
				03		20	
				04,06		30	
	I_{CC}-50	(50% duty cycle into 35Ω load)		01,07,08		140	
				03		140	
				04		110	
				05,06		130	
	I_{EE}-50	(50% duty cycle into 35Ω load)		01,07,08		50	
				02		130	
				03		30	
				04		25	
				05		35	

See footnotes at end of table.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ $-55°C \le T_C \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Power supply - continued							
	I_{CC1}-50	(50% duty cycle into 35Ω load)	4,5,6	01,07,08		35	mA
				02,05		45	
				03		20	
				04,06		30	
	I_{CC}-100	(100% duty cycle into 35Ω load)	1,2,3	01,07,08		240	
				03		240	
				04,06		220	
				05		235	
	I_{EE}-100	(100% duty cycle into 35Ω load)		01,07,08		50	
				02		225	
				03,04		30	
				05		35	
	I_{CC1}-100	(100% duty cycle into 35Ω load)		01,07,08		35	
				02,05		45	
				03		20	
				04,06		30	
Receiver							
Input resistance	R_{IN}	1 MHz sine wave 2/	4,5,6	All	7		kΩ
Input capacitance	C_{IN}	1 MHz sine wave 2/	4	All		5	pF
Threshold voltage	V_{TH}	4/	1,2,3	01,02,03, 04,05,06	0.56	1.05	Vp-p
				07,08	0.80	1.2	
		4/ Group C end point electricals		01,03,04, 05,06,07,08	0.50	1.1	
				02	0.56	1.0	

See footnotes at end of table.

TABLE I. Electrical performance characteristics - continued.

Test	Symbol	Conditions 1/ $-55°C \le T_C \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Transmitter							
Output resistance (transmitter off)	R_{OUT}	1 MHz sine wave 2/	4,5,6	All	10		kΩ
Output capacitance (transmitter off)	C_{OUT}	1 MHz sine wave 2/	4	All		5	pF
Output offset voltage	V_{OS}	2/ 5/	4,5,6	All		±90	mV pk
Peak amplitude variation	A_V	2/ 6/	4,5,6	01,03,04, 05,06,07,08	-15	+15	%
Receiver							
Delay time, input to output	t_{DR}	Delay time from differential input zero crossing to DATA or DATA (see figure 3) 2/	9,10,11	All		400	ns
Strobe delay	t_{DS}	Delay time from strobe rising or falling edge to DATA or DATA (see figure 3) 2/	9,10,11	01,02,03, 05,06,07,08		200	
				04		250	
Transmitter							
Rise time	t_R	Output load = 35Ω (see figure 3)	9,10,11	All	100	300	ns
Fall time	t_F			All	100	300	
Delay time	t_{DT}	Output load = 35Ω (see figure 3) 2/		01,02,05, 07,08		250	
				04		350	
				03,06		150	
Inhibit delay inhibiting	t_{DI-H}	Output load = 35Ω (see figure 3) 2/		01,02,04, 05,07,08		450	
				03,06		200	
Inhibit delay active	t_{DI-L}	Output load = 35Ω (see figure 3) 2/		01,02,04, 05,07,08		250	
				03,06		100	

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

1/ V_{CC} = +15 V, for device types 01, 03, 04, 05, 06, 07, and 08, V_{EE} = -15 V for device types 01, 02, 03, 04, 05, 07, and 08, V_{CC1} = +5 V.

2/ This parameter is tested initially and after any process or design change which may affect this parameter.

3/ These parameters are tested on a go-no-go basis in conjunction with other measured parameters and are not directly testable.

4/ Threshold is measured in direct coupled mode including the transformer. Threshold is the maximum level on the BUS at which there are no pulses on either receiver output. Divide by 1.4 to obtain threshold in transformer coupled mode. Add 0.14 V in direct coupled mode or 0.10 V in transformer coupled mode to obtain threshold at which no errors are observed when receiver is used with 15530 CMOS Manchester encoder-decoder.

5/ Measured across 35Ω load, 2.5 μs after parity bit mid-bit zero crossing of a 660 microseconds message.

6/ Measured across 35Ω load, variation of average peak amplitude.

3.8 Certificate of conformance. A certificate of conformance as required in MIL-H-38534 shall be provided with each lot of microcircuits delivered to this drawing.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-H-38534.

4.2 Screening. Screening shall be in accordance with MIL-H-38534. The following additional criteria shall apply:

a. Burn-in test, method 1015 of MIL-STD-883.

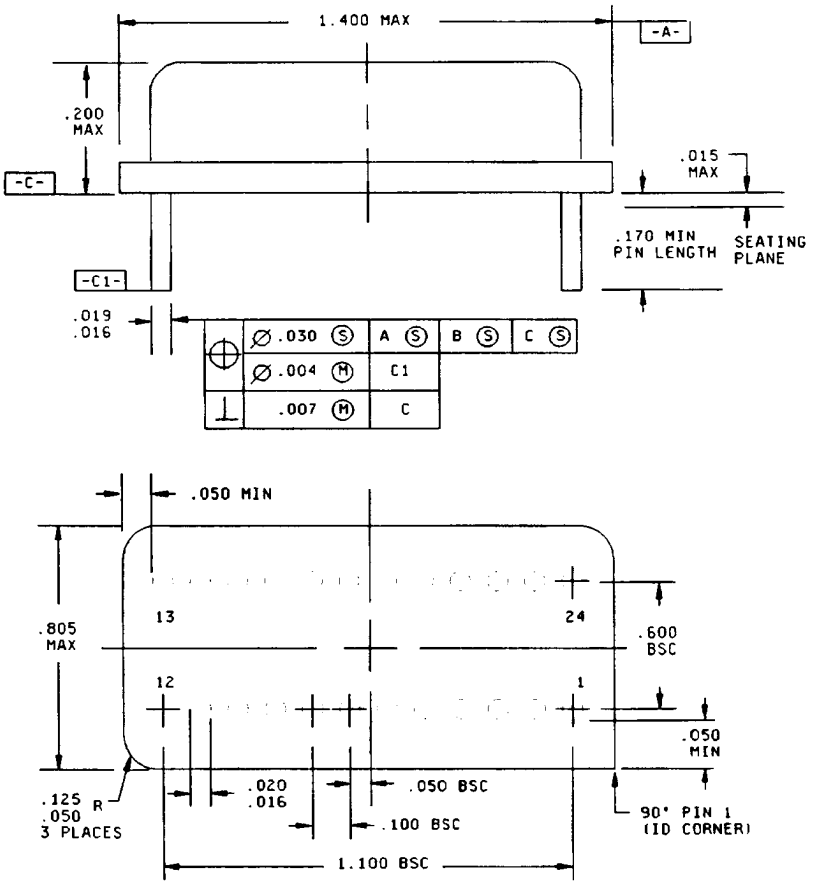
(1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to either DESC-EC or the acquiring activity upon request. Also, the test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1015.

(2) T_A as specified in accordance with table I of method 1015 of MIL-STD-883.

b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

Device types 01, 05, 07, and 08

Case X



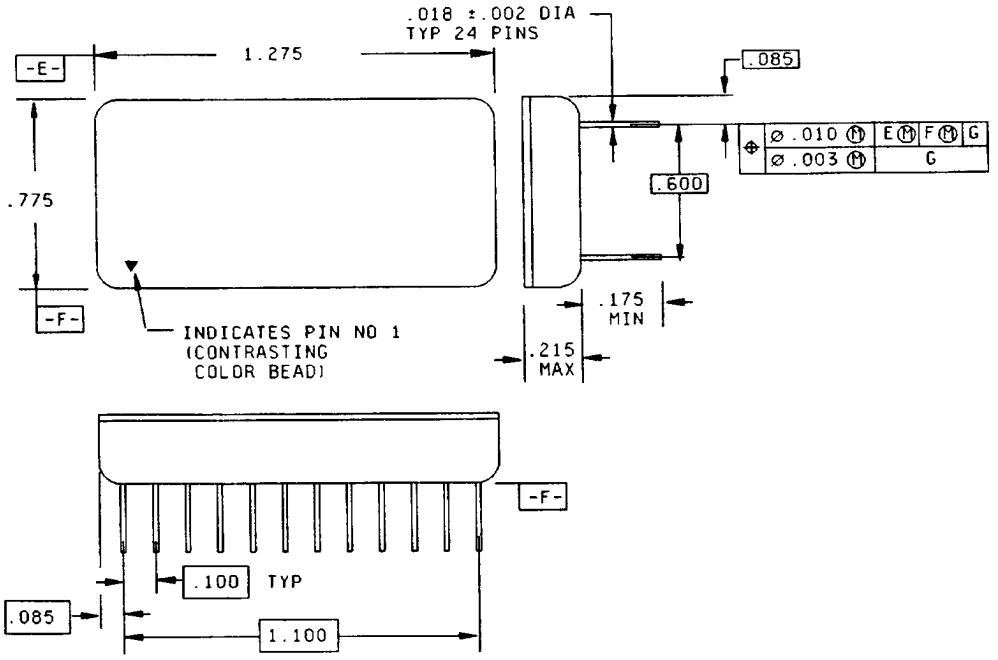
Inches	mm	Inches	mm
.004	0.10	.100	2.54
.007	0.18	.125	3.18
.015	0.38	.170	4.32
.016	0.41	.200	5.08
.019	0.48	.600	15.24
.020	0.50	.805	20.45
.030	0.76	1.100	27.94
.050	1.27	1.400	35.56

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Lead identification numbers are for reference only.
4. Lead spacing dimensions apply only at seating plane.
5. The total number of terminals are 24.

FIGURE 1. Case outlines.

Device types 03, 05, and 06

Case Y

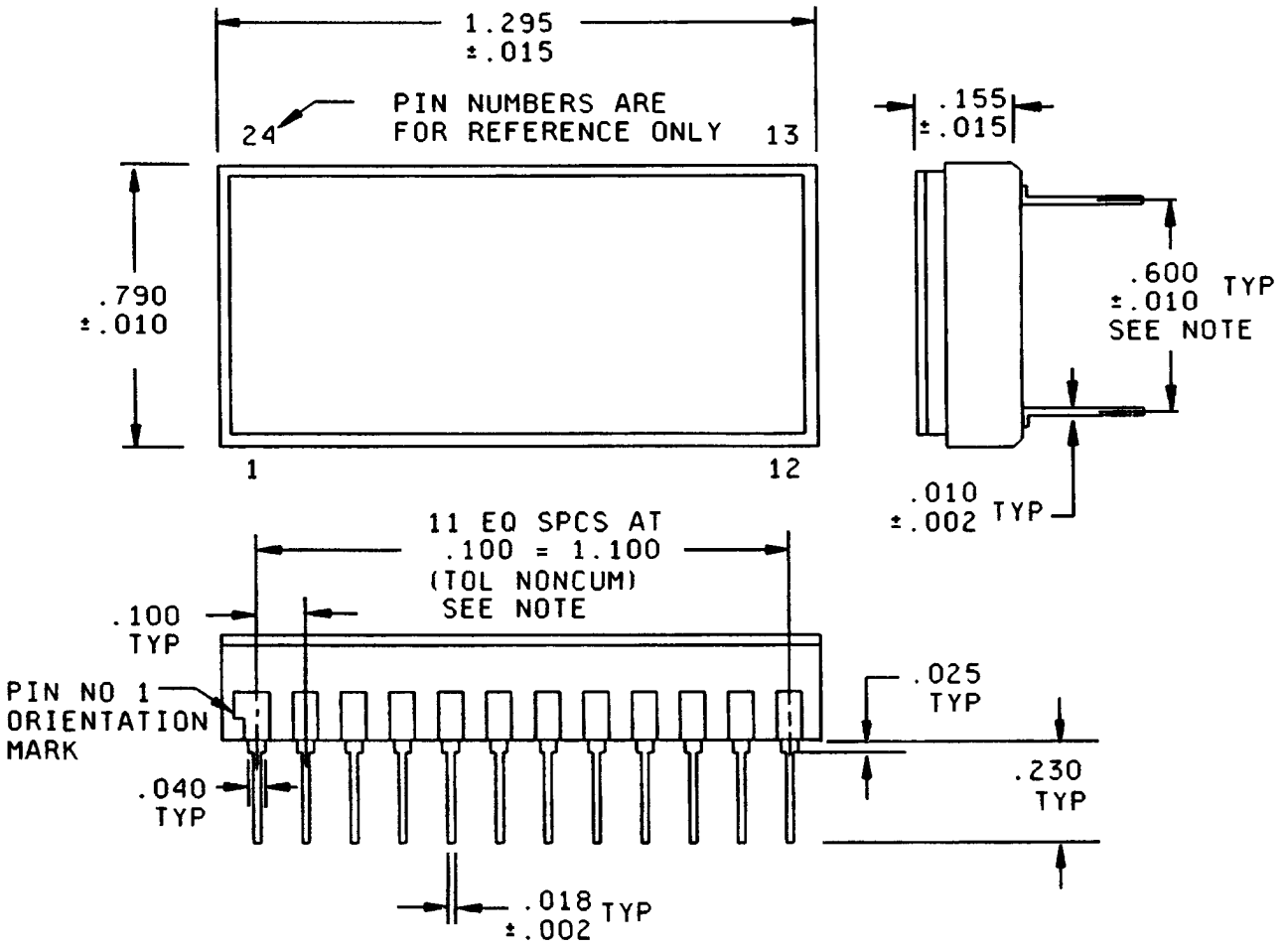


Inches	mm
.002	0.05
.003	0.07
.010	0.25
.018	0.45
.085	2.15
.100	2.54
.175	4.44
.215	5.45
.600	15.24
.775	19.68
1.100	27.94
1.275	32.38

FIGURE 1. Case outlines - Continued.

Device type 02

Case Z



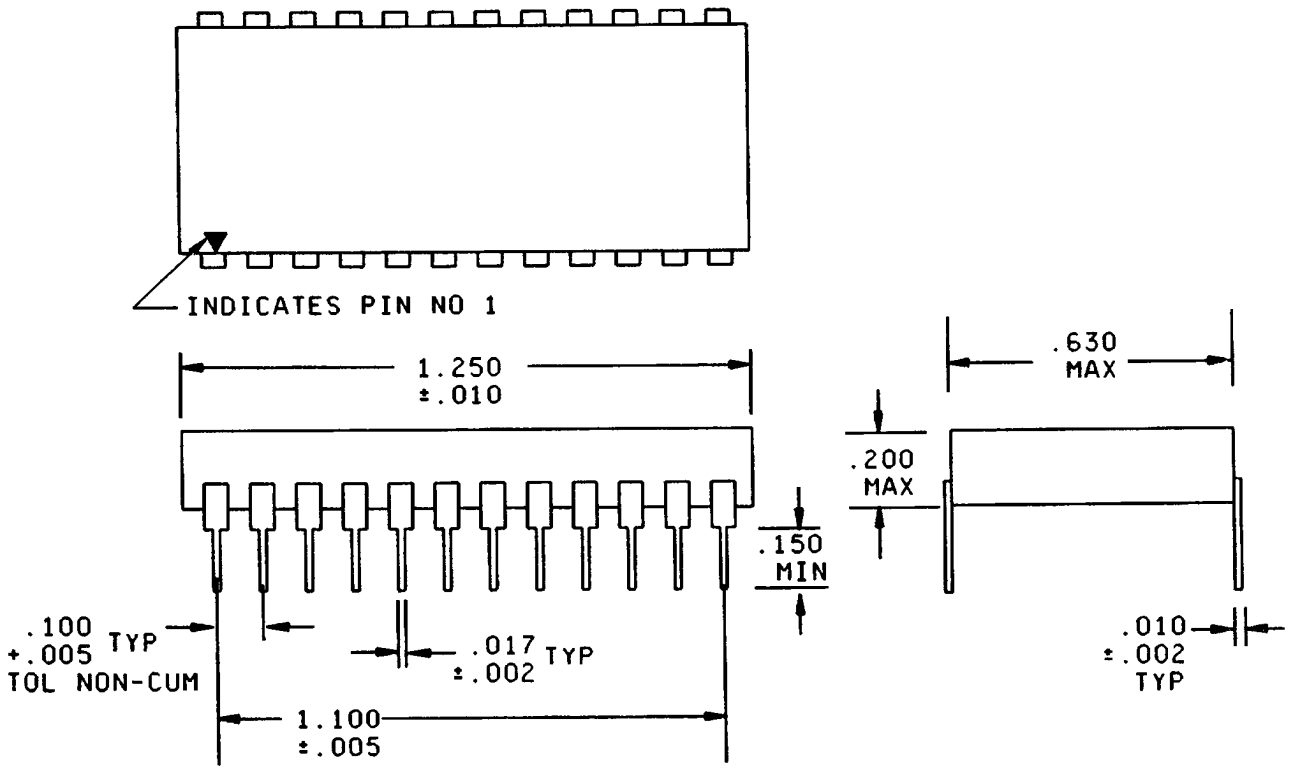
Inches	mm
.002	0.05
.010	0.25
.015	0.38
.018	0.46
.025	0.64
.040	1.02
.100	2.54
.155	3.94
.230	5.84
.600	15.24
.790	20.07
1.100	27.94
1.295	32.89

NOTE: Lead cluster to be centralized within ±0.010 of outline dimensions.

FIGURE 1. Case outlines - Continued.

Device type 04

Case U

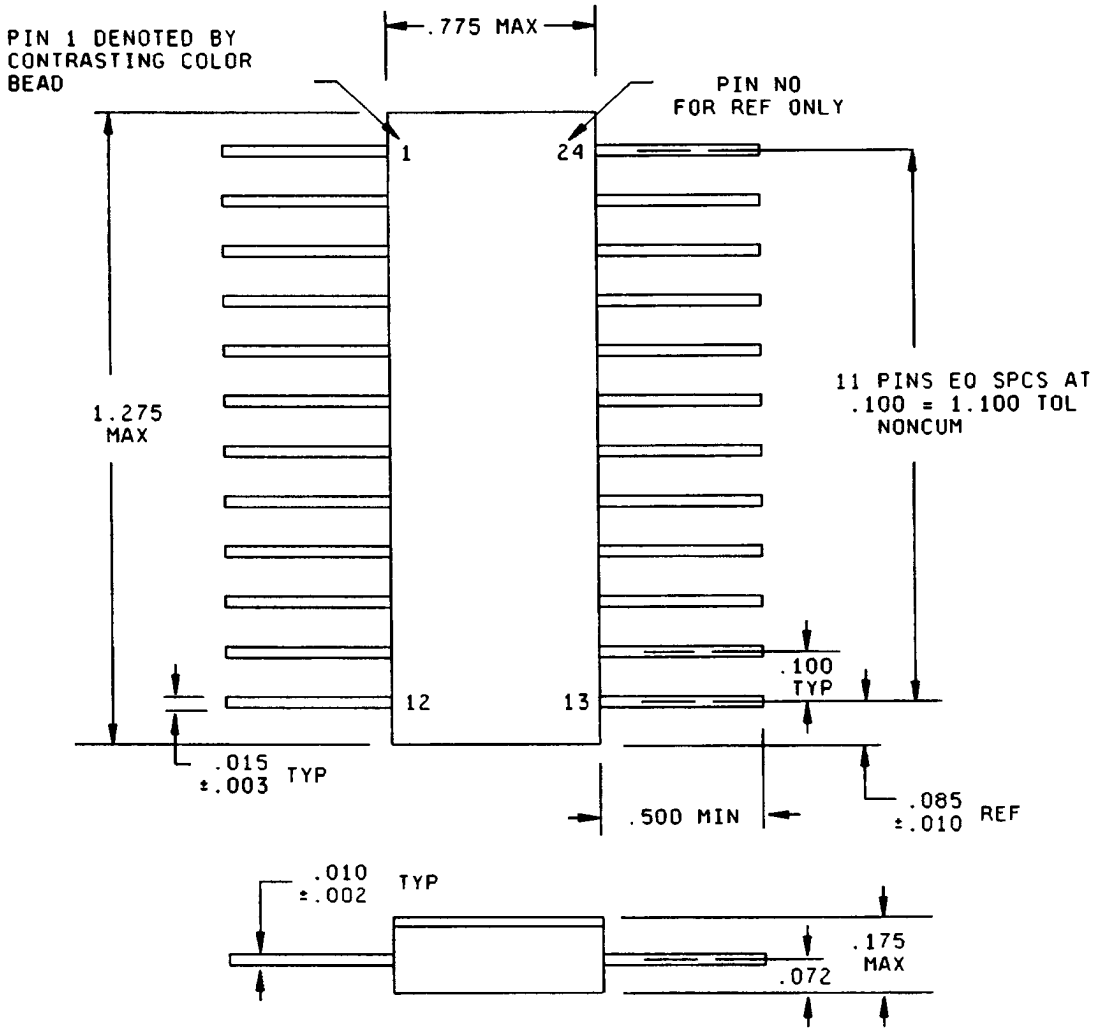


Inches	mm
.002	0.05
.005	0.13
.010	0.25
.017	0.43
.100	2.54
.150	3.81
.200	5.08
.600	15.24
.630	16.00
1.100	27.94
1.250	31.75

FIGURE 1. Case outlines - Continued.

Device type 02 and 06

Case T



Inches	mm
.002	0.05
.003	0.08
.010	0.25
.015	0.38
.072	1.83
.085	2.16
.100	2.54
.175	4.45
.500	12.70
.775	19.68
1.100	27.94
1.275	32.39

FIGURE 1. Case outlines - Continued.

Device type	All		
Case outline	Cases X, Y, Z, U, and T		
Terminal number	Terminal symbol	Terminal number	Terminal symbol
1	TX Data Out	13	V_{CC} 1/
2	TX $\overline{\text{Data}}$ Out	14	No connection
3	Ground 1/	15	RX Data Out
4	No connection	16	RX $\overline{\text{Data}}$ Out
5	No connection	17	No connection
6	No connection	18	Ground 1/
7	RX Data Out	19	V_{EE} 2/
8	Strobe	20	V_{CC1}
9	Ground 1/	21	TX Inhibit
10	RX $\overline{\text{Data}}$ Out	22	TX Data In
11	No connection	23	TX $\overline{\text{Data}}$ In
12	No connection	24	No connection

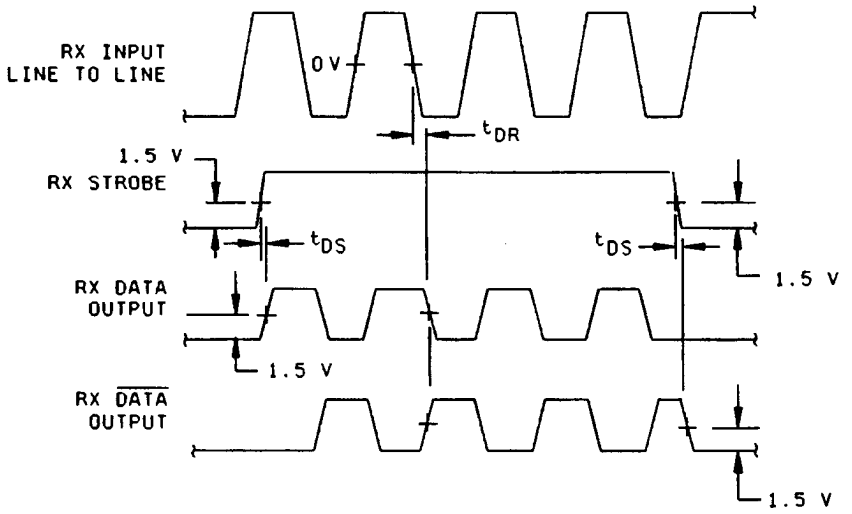
1/ GND pins should all be connected externally. Pin 13 is +15 V dc for device types 01, 03, 04, 05, 06, 07, and 08 only, no connection for device type 02.

2/ Pin 19 for device type 06, only, no connection.

FIGURE 2. Terminal connections.

Device types 01 through 07

Receiver timing



Transmitter timing

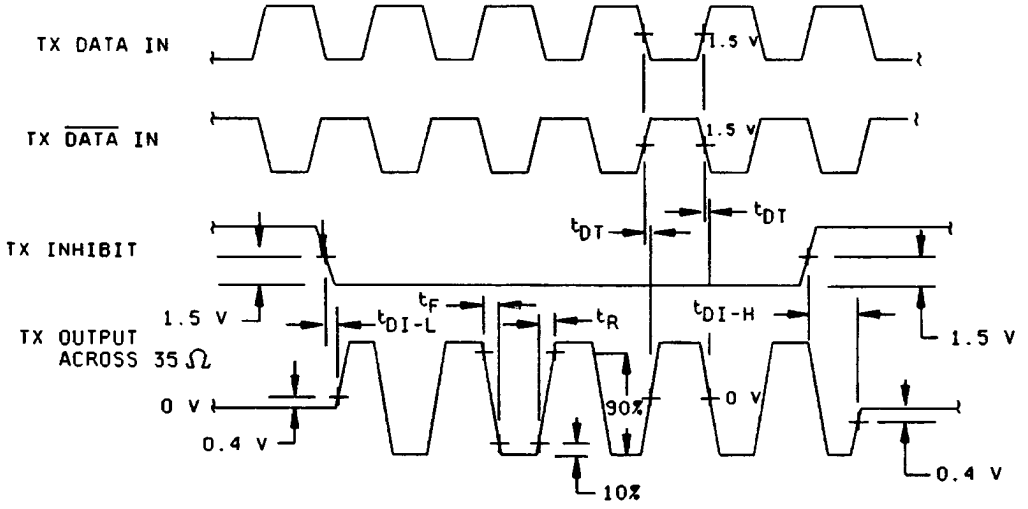


FIGURE 3. Waveforms.

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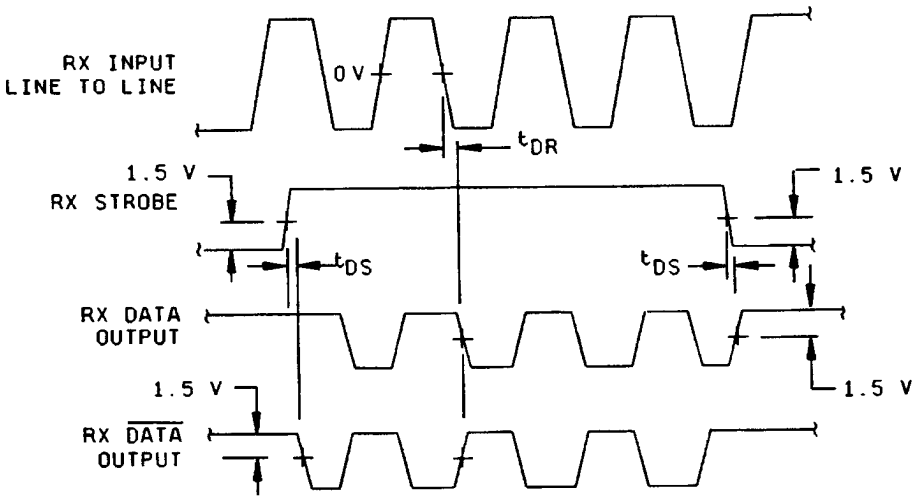
		REVISION LEVEL C	SHEET 17

Device type 08

Receiver timing



Transmitter timing

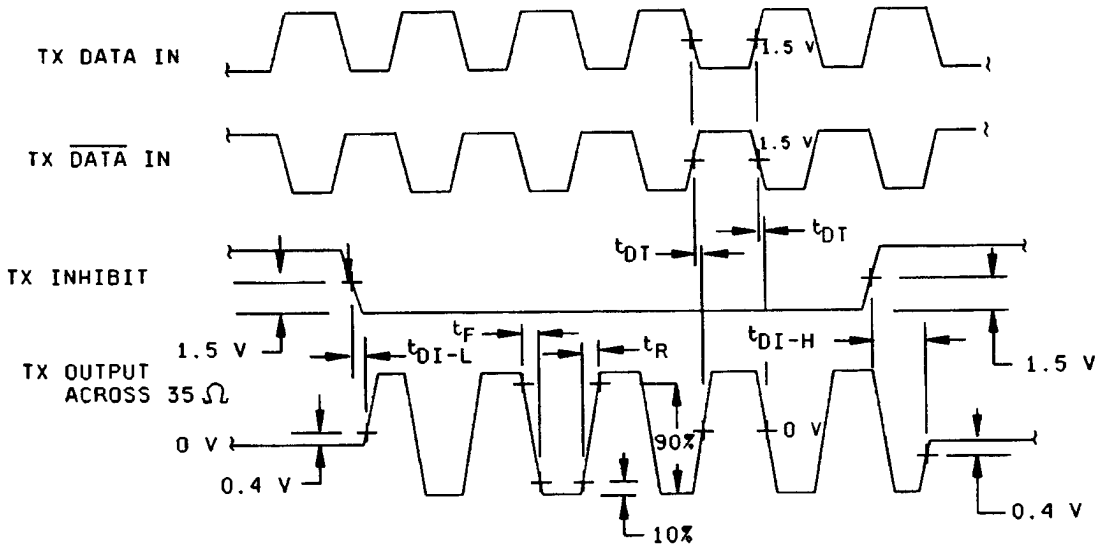


FIGURE 3. Waveforms - Continued.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-86049
		REVISION LEVEL C	SHEET 18

DESC FORM 193A
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TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (in accordance with method 5008, group A test table)
Interim electrical parameters	---
Final electrical test parameters	1*,2,3,4,5,6, 9,10,11
Group A test requirements	1,2,3,4,5,6 9,10,11
Group C end-point electrical parameters	1,2,3
Group E end-point electrical parameters for RHA devices	Subgroups** (in accordance with method 5005, group A test table)

* PDA applies to subgroup 1.
** When applicable to this standardized military drawing, the subgroups shall be defined.

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with MIL-H-38534 and as specified herein.

4.3.1 Group A inspection. Group A inspection shall be in accordance with MIL-H-38534 and as follows:

a. Tests shall be as specified in table II herein.

b. Subgroups 7 and 8 shall be omitted.

4.3.2 Group B inspection. Group B inspection shall be in accordance with MIL-H-38534.

4.3.3 Group C inspection. Group C inspection shall be in accordance with MIL-H-38534 and as follows:

a. End-point electrical parameters shall be as specified in table II herein.

b. Steady-state life test, method 1005 of MIL-STD-883.

(1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to either DESC-EC or the acquiring activity upon request. Also, the test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1005.

(2) T_A as specified in accordance with table I of method 1005 of MIL-STD-883.

(3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

4.3.4 Group D inspection. Group D inspection shall be in accordance with MIL-H-38534.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-H-38534.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use for Government microcircuit applications (original equipment), design applications, and logistics purposes.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated with the users of record for the individual documents. This coordination will be accomplished in accordance with MIL-STD-973 using DD Form 1692, Engineering Change Proposal.

6.4 Record of users. Military and industrial users shall inform Defense Electronics Supply Center when a system application requires configuration control and the applicable SMD. DESC will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronics devices (FSC 5962) should contact DESC-EC, telephone (513) 296-6047.

6.5 Comments. Comments on this drawing should be directed to DESC-EC, Dayton, Ohio 45444, or telephone (513) 296-5373.

6.6 Approved sources of supply. Approved sources of supply are listed in QML-38534. Additional sources will be added to QML-38534 as they become available. The vendors listed in QML-38534 have agreed to this drawing and a certificate of compliance (see 3.7 herein) has been submitted to and accepted by DESC-EC.