REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED

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

PMIC N/A

STANDARD MICROCIRCUIT DRAWING

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

AMSC N/A

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DRAWING APPROVAL DATE
96-10-30

REVISION LEVEL

DEFENSE SUPPLY CENTER COLUMBUS
COLUMBUS, OHIO 43216-5000

MICROCIRCUIT, HYBRID, DIGITAL-LINEAR, 12-BIT, DUAL, ANALOG TO DIGITAL CONVERTER

SIZE	CAGE CODE	
A	**67268**	**5962-95815**

SHEET 1 OF 12

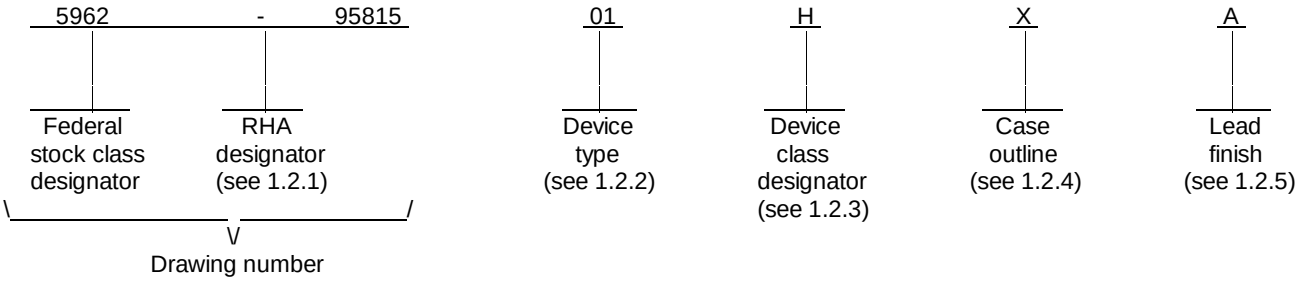
DESC FORM 193
JUL 94

5962-E555-96

1. SCOPE

1.1 Scope. This drawing documents five product assurance classes, class D (lowest reliability), class E, (exceptions), class G (lowest high reliability), class H (high reliability), and class K, (highest reliability) and a choice of case outlines and lead finishes are available and are reflected in the Part or Identifying Number (PIN). When available, a choice of radiation hardness assurance levels are reflected in the PIN.

1.2 PIN. The PIN shall be as shown in the following example:



1.2.1 Radiation hardness assurance (RHA) designator. Device classes H and K RHA marked devices shall meet the MIL-PRF-38534 specified RHA levels and shall be marked with the appropriate RHA designator. A dash (-) indicates a non-RHA device.

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

Device type	Generic number	Circuit function
01	AD10242	Dual, 12-bit, 40 MSPS, MCM, analog to digital converter

1.2.3 Device class designator. This device class designator shall be a single letter identifying the product assurance level as follows:

Device class	Device performance documentation
D, E, G, H or K	Certification and qualification to MIL-PRF-38534

1.2.4 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	68	Leaded ceramic chip carrier

1.2.5 Lead finish. The lead finish shall be as specified in MIL-PRF-38534.

1.3 Absolute maximum ratings. 1/

Positive supply voltage (V_{CC})	0 V dc to +7.0 V dc
Negative supply voltage (V_{EE})	0 V dc to -7.0 V dc
Analog input voltage	-7 .0 V dc to +7 V dc
Analog input current	-10 mA to +10 mA
Digital input voltage (ENCODE)	0 V dc to +7.0 V dc
ENCODE, ENCODE differential voltage	+4 V dc
Digital output current	-40 mA to +40 mA
Gain and offset adjust voltage range	$-V_{EE}$ to $+V_{CC}$
Digital input voltage range	+0.5 V to $-V_{EE}$
Power dissipation (P_D)	2.0 W
Thermal resistance junction-to-case (θ_{JC})	11°C/W
Thermal resistance junction-to-ambient (θ_{JA})	30°C/W
Junction temperature (T_J)	+175°C
Storage temperature	-65°C to +150°C
Lead temperature (soldering, 10 seconds)	+300°C

1.4 Recommended operating conditions.

Positive supply voltage (V_{CC})	+4.75 V dc to +5.25 V dc
Negative supply voltage (V_{EE})	-5.46 V dc to -4.96 V dc
Ambient operating temperature range (T_A)	-55°C to +125°C

2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and handbook. The following specification, standards, and handbook form a part of this drawing to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solitation.

SPECIFICATION

DEPARTMENT OF DEFENSE

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

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-883 - Test Methods and Procedures for Microelectronics.
MIL-STD-973 - Configuration Management.
MIL-STD-1835 - Microcircuit Case Outlines.

HANDBOOK

DEPARTMENT OF DEFENSE

MIL-HDBK-780 - Standard Microcircuit Drawings.

(Unless otherwise indicated, copies of the specification, standards, and handbook are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

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.

2.2 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 takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Item requirements. The individual item performance requirements for device classes D, E, G, H, and K shall be in accordance with MIL-PRF-38534. Compliance with MIL-PRF-38534 may include the performance of all tests herein or as designated in the device manufacturer's Quality Management (QM) plan or as designated for applicable device class. Therefore, the tests and inspections herein may not be performed for applicable device class (see MIL-PRF-38534). Futhermore, the manufacturers may take exceptions or use alternate methods to the tests and inspections herein and not perform them. However, the performance requirements as defined in MIL-PRF-38534 shall be met for the appilcable device class. The modification in the QM plan shall not affect the form, fit, or function as described herein.

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

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.4 herein and figure 1

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

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 defined in table I.

3.5 Marking of Device(s). Marking of device(s) shall be in accordance with MIL-PRF-38534. The device shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's vendor similar PIN may also be marked as listed in QML-38534.

3.6 Data. In addition to the general performance requirements of MIL-PRF-38534, the manufacturer of the device described herein shall maintain the electrical test data (variables format) from the initial quality conformance inspection group A lot sample, for each device type listed herein. Also, the data should 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 (DSCC-VA) upon request.

3.7 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to supply to this drawing. The certificate of compliance (original copy) submitted to DSCC-VA shall affirm that the manufacturer's product meets the performance requirements of MIL-PRF-38534 and herein.

3.8 Certificate of conformance. A certificate of conformance as required in MIL-PRF-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-PRF-38534 or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described 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	
Offset error	OFF_{ERROR}		1	01	-0.5	+0.5	%FS
			2,3		-2.0	+2.0	
Gain error 2/	AV_{ERROR}		1	01	-1.0	+1.0	%FS
			2,3		-1.5	+1.5	
Analog input resistance	A_{IN1}	3/	1,2,3	01	99	101	ohms
	A_{IN2}				198	202	
	A_{IN3}				396	404	
Input capacitance	C_{IN}	3/ 4/	1			7.0	pF
Logic "1" voltage (analog)	V_{IH}	5/ 6/	1,2,3	01	2.0	5.0	V
Logic "0" voltage (analog)	V_{IL}	5/ 6/	1,2,3	01	0	0.8	V
Logic "1" current (analog)	I_{IH}	V_{INH} = 5 V 5/ 6/	1,2,3	01		800	µA
Logic "0" current (analog)	I_{IL}	V_{INL} = 0 V 5/ 6/	1,2,3	01	-400		µA
Logic "1" voltage output (digital)	V_{IH}	7/	1,2,3	01	3.5		V
Logic "0" voltage output (digital)	V_{IL}	8/	1,2,3	01		0.65	V
Supply currents	$I_{CCTOTAL}$		1,2,3	01		400	mA
ENCODE pulse width high	ENC_{HI}	3/	4,5,6	01	12		ns
ENCODE pulse width low	ENC_{LO}	3/	4,5,6	01		41	ns

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	
Output delay	t_{DD}	3/	4,5,6	01	10	14	ns
Maximum conversion rate	CNV_{MAX}	9/	4,5,6	01	40		MSPS
Signal-to-noise ratio 10/	SNR	Analog input at 4.85 MHz and 9.9 MHz	4	01	63		dB
			5,6		62		
		Analog input at 19.5 MHz	4		60		
			5,6		59		
Signal-to-noise and distortion 11/	SINAD	Analog input at 4.85 MHz	4	01	62		dB
			5,6		61		
		Analog input at 9.9 MHz	4,5,6		60		
		Analog input at 19.5 MHz	4,5,6		58		
Spurious free dynamic range 12/	SPUR	Analog input at 4.85 MHz	4,5,6	01	70		dBFS
		Analog input at 9.9 MHz			63		
		Analog input at 19.5 MHz			60		
Two tone intermodulation distortion rejection 13/	IMD	F1, F2, at -7 dBFS	4,5,6	01	-70		dBc
Channel to channel isolation 14/	ISO		1	01	-75		dB
Overvoltage recovery time 15/	ORT	V_{IN} = 2.0 x full scale	4,5,6	01		100	ns
		V_{IN} = 4.0 x full scale				200	

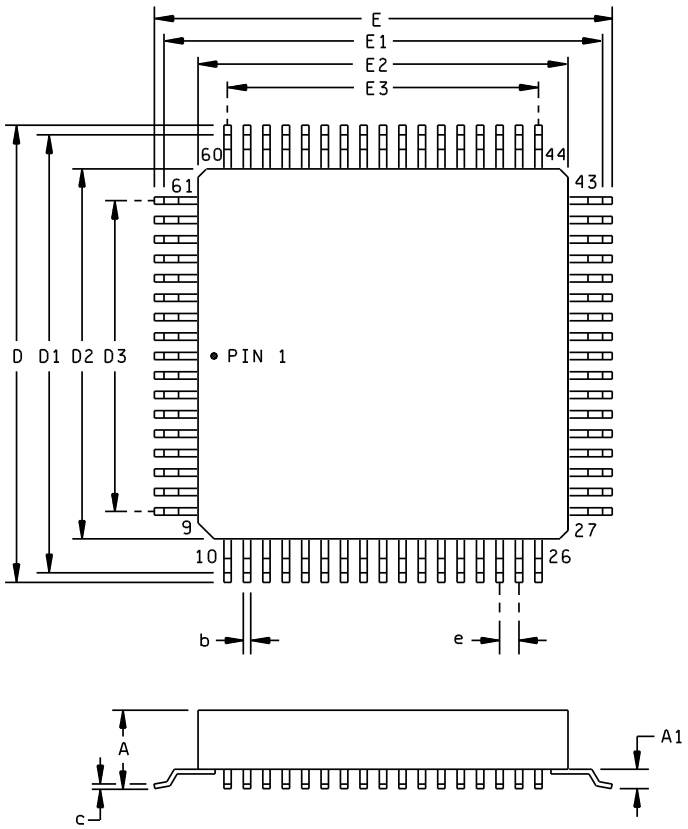
See footnotes at end of table.

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	
Power supply rejection ratio	PSRR	$+4.75\ V \le V_{CC} \le +5.25\ V$	7,8	01		0.02	%FSR/ % V_{CC}
		$-5.45\ V \le V_{EE} \le -4.96\ V$				0.02	%FSR/ % V_{EE}

1/ V_{CC}(analog) = +5 V dc, V_{EE} = -5 V dc, and V_{CC}(digital) = +5 V dc, unles otherwise specified.
2/ Gain test is preformed on $A_{IN}3$ over the specified input voltage range.
3/ Parameter shall be tested as part of device initial characterization and after design and process changes. Parameter shall be guaranteed to the limits specified in table I for all lots not specifically tested.
4/ Input capacitance specifications combines die and package capacitance.
5/ ENCODE (pin 4) driven single-ended source: ENCODE (pin 5) bypassed to ground through 0.01 µF capacitor.
6/ ENCODE (pin 4) may also be driven differentially in conjunction with ENCODE (pin 5).
7/ Outputs sourcing 10 µA.
8/ Outputs sinking 10 µA.
9/ Maximum conversion rate allows for variation in ENCODE DUTY CYCLE of 50%, ±5%
10/ Analog input signal power at -1 dBFS; signal-to-noise ratio (SNR) is the ratio of signal level to total noise (first 5 harmonics removed). ENCODE = 40 MSPS.
11/ Analog input signal power at -1 dBFS; signal-to-noise and distortion (SINAD) is the ratio of signal level to total noise plus harmonics. ENCODE = 40 MSPS.
12/ Analog input signal equals -1 dBFS; SFDR is the ratio of converter full scale to worst spur.
13/ Both input zones at -7 dBFS; two tone intermodulation distortion (IMD) rejection is the ratio of either tone to the worst third order intermod product. f1 = 10.0 MHz ±100kHz, 50 kHz ≤ f1 - f2 ≤ 300 kHz.
14/ Channel to channel isolation tested with A channel grounded and a full scale signal applied to B channel ($A_{IN}1$).
15/ Input driven to 2 times and 4 times. $A_{IN}1$ range for >4 clock cycles. Output recovers inband in specific time with ENCODE = 40 MSPS. No foldover guaranteed.

Case outline X.



Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A		5.97		0.235
A1	0.18	1.02	0.040	0.060
e	1.14	1.40	0.045	0.055
b	0.36	0.51	0.014	0.020
c	0.18	0.25	0.007	0.010
D / E	29.72	30.23	1.170	1.190
D1 / E1	27.18		1.070	
D2 / E2	23.88	24.38	0.940	0.960
D3 / E3	20.32 BSC		0.800 BSC	

NOTES:
1. The U.S. preferred system of measurement is the metric SI. This item was designed using inch-pound units of measurement. In case of problems involving conflicts between the metric and inch-pound units, the inch-pound units shall rule.
2. Pin 1 dot and pin numbers are for reference only.

FIGURE 1. Case outline(s).

Device type	01	Device type	01	Device type	01
Case outline	X	Case outline	X	Case outline	X
Terminal number	Terminal symbol	Terminal number	Terminal symbol	Terminal number	Terminal symbol
1	Shield	24	D7A	47	D9B
2	Channel A Ground	25	D8A	48	D10B
3	Unipolar negative A	26	Channel A Ground	49	D11B
4	Unipolar common A	27	Channel A Ground	50	DV_{CC}
5	Channel A Ground	28	$\overline{\text{Encode A}}$	51	Encode B
6	Analog input A1	29	Encode A	52	$\overline{\text{Encode B}}$
7	Analog input A2	30	DV_{CC}	53	Channel B ground
8	Analog input A3	31	D9	54	Channel B ground
9	Channel A Ground	32	D10	55	Unnipolar common B
10	Channel A Ground	33	D11A	56	Unipolar negative B
11	Channel A Ground	34	No connect	57	Unipolar positive B
12	Unipolar positive A	35	No connect	58	Channel B ground
13	AV_{EE}	36	D0B	59	Channel B ground
14	AV_{CC}	37	D1B	60	Channel B ground
15	No connect	38	D2B	61	Channel B ground
16	No connect	39	D3B	62	Analog input B1
17	D0A	40	D4B	63	Analog input B2
18	D1A	41	D5B	64	Analog input B3
19	D2A	42	D6B	65	Channel B ground
20	D3A	43	Channel B ground	66	AV_{CC}
21	D4A	44	Channel B ground	67	AV_{EE}
22	D5A	45	D7B	68	Channel B ground
23	D6A	46	D8B		

FIGURE 2. Terminal connections.

TABLE II. Electrical test requirements.

MIL-PRF-38534 test requirements	Subgroups (in accordance with MIL-PRF-38534,group A test table)
Interim electrical parameters	1
Final electrical test parameters	1*,2,3,4,5,6
Group A test requirements	1,2,3,4,5,6
Group C end-point electrical parameters	1
MIL-STD-883, 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 standard microcircuit drawing, the subgroups shall be defined.

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

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

(1) Test condition A, B, C, and D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to either DSCC-VA 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 of MIL-STD-883.

(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.

4.3 Conformance and periodic inspections. Conformance inspection (CI) and periodic inspection (PI) shall be in accordance with MIL-PRF-38534 and as specified herein.

4.3.1 Group A inspection (CI). Group A inspection shall be in accordance with MIL-PRF-38534 and as follows:

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

b. Subgroups 7, 8 9, 10, and 11 shall be omitted.

4.3.2 Group B inspection (PI). Group B inspection shall be in accordance with MIL-PRF-38534.

4.3.3 Group C inspection (PI). Group C inspection shall be in accordance with MIL-PRF-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 DSCC-VA 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 of MIL-STD-883.

(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 (PI). Group D inspection shall be in accordance with MIL-PRF-38534.

4.3.5 Group E inspection. Group E inspection is required only for parts intended to be marked as radiation hardness assured (see 3.5 herein). RHA levels shall be M, D, R, and H. RHA quality conformance inspection sample tests shall be performed at the RHA level specified in the acquisition document.

a. RHA tests for levels M, D, R, and H shall be performed through each level to determine at what levels the devices meet the RHA requirements. These RHA tests shall be performed for initial qualification and after design or process changes which may affect the RHA performance of the device.

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

c. Prior to total dose irradiation, each selected sample shall be assembled in its qualified package. It shall pass the specified group A electrical parameters in table I for subgroups specified in table II herein.

d. The devices shall be subjected to radiation hardness assured tests as specified in MIL-PRF-38534 for RHA level being tested, and meet the postirradiation end-point electrical parameter limits as defined in table I at T_A = +25°C ±5 percent, after exposure.

e. Prior to and during total dose irradiation testing, the devices shall be biased to establish a worst case condition as specified in the radiation exposure circuit.

f. For device classes H and K, subgroups 1 and 2 in table V, method 5005 of MIL-STD-883 shall be tested as appropriate for device construction.

g. When specified in the purchase order or contract, a copy of the RHA delta limits shall be supplied.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-PRF-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 Supply Center Columbus when a system application requires configuration control and the applicable SMD. DSCC 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 microelectronic devices (FSC 5962) should contact DSCC-VA, telephone (614) 692-7603.

6.5 Comments. Comments on this drawing should be directed to DSCC-VA, Columbus, Ohio 43216-5000, or telephone (614) 692-0512.

6.6 Sources of supply for device classes H and K. Sources of supply are listed in QML-38534. The vendors listed in QML-38534 have submitted a certificate of compliance (see 3.7 herein) to DSCC-VA and have agreed to this drawing.

STANDARD MICROCIRCUIT DRAWING SOURCE APPROVAL BULLETIN

DATE: 96-10-30

Approved sources of supply for SMD 5962-95815 are listed below for immediate acquisition only and shall be added to QML-38534 during the next revision. QML-38534 will be revised to include the addition or deletion of sources. The vendors listed below have agreed to this drawing and a certificate of compliance has been submitted to and accepted by DSCC-VA. This bulletin is superseded by the next dated revision of QML-38534.

Standard microcircuit drawing PIN 1/	Vendor CAGE number	Vendor similar PIN 2/
5962-9581501HXA	34031	AD10242TZ/883B

1/ The lead finish shown for each PIN representing a hermetic package is the most readily available from the manufacturer listed for that part. The device manufacturers listed herein are authorized to supply alternate lead finishes "A", "B", or "C" at their discretion. Contact the listed approved source of supply for further information.

2/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

Vendor CAGE number	Vendor name and address
34031	Analog Devices Incorporated 7910 Triad Center Drive Greensboro, NC 27409-9605

The information contained herein is disseminated for convenience only and the Government assumes no liability whatsoever for any inaccuracies in this information bulletin.