8259A

Programmable Interrupt Controller iAPX86 Family MILITARY INFORMATION

DISTINCTIVE CHARACTERISTICS

- SMD/DESC qualified
- · Eight-level priority controller
- · Expandable to 64 levels
- Programmable interrupt modes

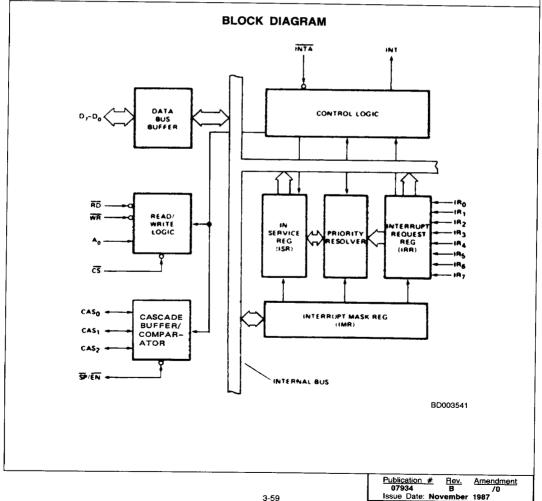
- Individual request mask capability
- Single + 5-V supply (no clocks)
- 28-pin dual-in-line package

GENERAL DESCRIPTION

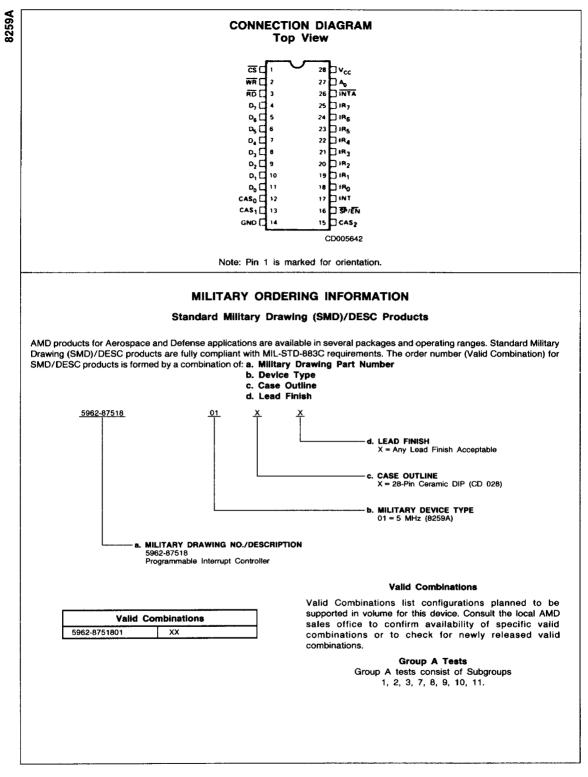
The 8259A Programmable Interrupt Controller handles up to eight vectored priority interrupts for the CPU. It is cascadable for up to 64 vectored priority interrupts without additional circuitry. It is packaged in a 28-pin DIP, uses NMOS technology, and requires a single + 5-V supply. Circuitry is static, requiring no clock input.

The 8259A is designed to minimize the software and realtime overhead in handling multi-level priority interrupts. It has several modes, permitting optimization for a variety of system requirements.

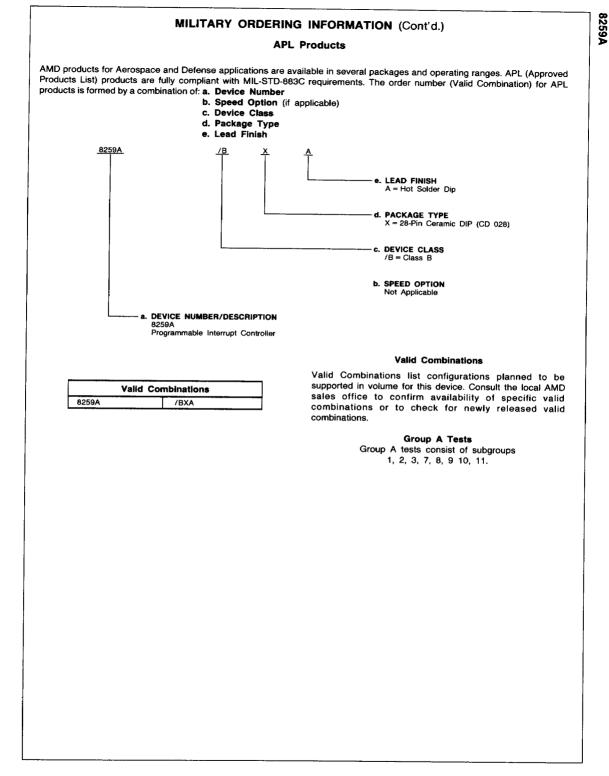
The 8259A is fully upward-compatible with the 8259. Software originally written for the 8259 will operate the 8259A in all 8259-equivalent modes.



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ABSOLUTE MAXIMUM RATINGS

Storage Temperature65 to +150°C
Voltage on Any Pin
with Respect to Ground0.5 V to +7 V
Power Dissipation1 W

Stresses above those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent device failure. Functionality at or above these limits is not implied. Exposure to absolute maximum ratings for extended periods may affect device reliability.

OPERATING RANGES

Military (M) Devices

Temperature (T _C)	°C
Supply Voltage (V _{CC}))%

Operating ranges define those limits between which the functionality of the device is guaranteed.

DC CHARACTERISTICS over operating range (for SMD/DESC and APL Products, Group A, Subgroups 1, 2, 3 are tested unless otherwise noted)

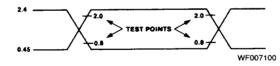
Parameter Symbol	Parameter Description	Test Conditions	Min.	Max.	Unit
VIL	Input LOW Voltage	$V_{\rm CC} = 4.5$ V to 5.5 V	-0.5*	0.8	v
VIH	Input HIGH Voltage	$V_{CC} = 4.5 V$ to 5.5 V	2.3	V _{CC} + 0.5 V*	v
VOL	Output LOW Voltage	I _{OL} = 2.2 mA, V _{CC} = 4.5 V		0.45	v
VOH	Output HIGH Voltage	$I_{OH} = -400 \ \mu A, \ V_{CC} = 4.5 \ V$	2.4		v
VOH(INT)	Interrupt Output HIGH Voltage	$I_{OH} = -100 \ \mu A, \ V_{CC} = 44. V$ $I_{OH} = -400 \ \mu V \ V_{CC} = 43. V$	3.5 2.4		v v
lu	Input Load Current	V 5 5 N = 5.5 Y and 0 V	- 10	+ 10	μA
LOL, LOH	Output Leakage Current	V V V V V V V V V V V V V V V V V V V	- 10	+ 10	μA
lcc	V _{CC} Supply Current	Von = 5.4 V (Note 1)		125	mA

CAPACITANCE (TAL 23CO VIC = GND = 0 V)

Parameter Symbol	Parameter Description	Test Conditions	Min.	Max.	Unit
CINT	Input Capacitance	fc = 1 MHz		10*	pF
Civot	I/O Capacitance	Unmeasured pins returned to VSS		20*	pF

*Guaranteed by design; not tested. †Not included in Group A tests.

SWITCHING TEST WAVEFORM



Input/Output

Note: AC testing inputs are driven at 2.4 V for a logic "1" and 0.45 V for a logic "0." Timing measurements are made at 2.0 V for a logic "1" and 0.8 V for a logic "0."

See Section 6 of the MOS Microprocessors and Peripherals Data Book (Order #09067A) for Thermal Characteristics information.

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SWITCHING CHARACTERISTICS over operating range (for SMD/DESC and APL Products, Group A, Subgroups 9, 10, 11 are tested unless otherwise noted).

TIMING REQUIREMENTS 1 taHRL Ag/CS Setup to RD/INTA1 2 tRHAX Ag/CS Hold after RD/INTA1 3 tRLRH RD Pulse Width 4 tAHWL Ag/CS Setup to WR1 5 twHAX Ag/CS Hold after WR1 6 twLWH WR Pulse Width 7 tDWWH Data Setup to WR1 8 twHDX Data Hold after WR1 9 tLLH Interrupt Request Width (LOW) 10 tCVIAL Cascade Setup Second or Third INTA1 (Slave Only) S5 ns 11 tRHRL End of RD to next Command 12 twHRL End of WR to next Command 13 tRLDV Data Valid from DO TA1 14 tRHDZ Data Valid from DO TA1 15 tJuHH Interrupt Nput Dev 14 tHHDZ Data Float after D/INTA1 15 tJuHH Interrupt Nput Dev 10 totat Float after D/INTA1 350 10 totat Float after D/INTA1 350 10 totat Float after D/INTA1 350							
1 Ap/CS Setup to FBD/INTA; 2 ItsHAX Ap/CS Hold after RD/INTA; 3 ItsLiHH RD Pulse Width 4 LaHWL Ap/CS Setup to WR; 5 ItsHAX Ap/CS Hold after WR; 6 MVLWH WR Pulse Width 7 ItpWWH Data Hold after WR; Pulse Width 9 TuliHH Interrupt Request Width (LOW) Pulse Width 10 toVIAL Cascade Setup Second or Third IRA1; Sile only 11 Iterrupt Request Width (LOW) 100 rss 12 MyHBL End of RD to next Command 3000 rss 13 IteLOV Data Float after DD/INTA; 100 rss 14 IteLOV Data Float after DD/INTA; 100 rss 15 UHHH Interrupt Request Width (ICOW) 100 rss 16 ItaLOV Data Float after DD/INTA; 100 rss 16 ItaLOV Data Float after DD/INTA; 100 rss 17 ItaLEL Test Vort SD V	TIMING	Symbol		Test Conditions	Min.	Max.	Unit
2 ImpAX Ag/CS Hold after RD/INTA: 3 ImpAX Ag/CS Setup to WR1; 5 ImpAX Ag/CS Setup to WR1; 6 MpLum WR Pulse Width 7 Tgrwm Data Setup to WR1; 8 MpHox Data Setup to WR1; 9 tupm 10 Kritik 11 Immarphi Regression 12 MpHox 10 Kritik 11 Immarphi Regression 12 MpHox 13 Immarphi Regression 14 Immarphi Regression 15 Umm 14 Immarphi Regression 15 Umm 14 Immarphi Regression 15 Umm 16 Value 16 Value 16 Value 17 Immarphi Regression 20 Data Valid Tog MDU ATA: 15 Umm 14 Immore Imparphonon 15		REQUIREMENT	S				
3 IRLEH RD Pulse Width 235 ns 4 IAHWL Ag/CS Setup to WR1. 0 ns 5 IVHAX. Ag/CS Hold after WR1. 0 ns 6 IVLWH WR Pulse Width 0 ns 7 torweitx Data Hold after WR1. 0 ns 8 IVHWLX Data Hold after WR1. 0 ns 9 tuLuH Interrupt Request Width (LOW) 0 ns 10 tvLuH. Clascade Setup Second or Third (NTA1*) 0 ns 11 thereit End of RD to next Command Setup 300 ns 12 IVHRL End of RD to next Command Setup 300 ns 12 IveRup Data Float after D/RN11 10 100 ns 13 tentod after WR1 to next Command Setup 10 100 ns 14 tentod To next Command Setup 10 100 ns 14 tentod Tentod after D/RN11 10 10 100 ns 15 tuHH Interupt Note Tron TD/O TN	1	t _{AHRL}			0		ns
4 1.4.HW Aq/CS Setup to WR: 0 ns 5 1.4.HW WR Pulse Width 0 ns 7 tzywH Data Setup to WR: 240 ns 8 1.4.HW WR Pulse Width 240 ns 9 tu_BH Interrupt Request Width (LCW) 0 ns 10 tcVAL (Sacade Setup Second or Third INTA! 0 ns 11 thereory Request Width (LCW) 300 ns 300 ns 10 tcVAL (Slave Only) 300 ns 300 ns 11 thereory Request Width (LCW) 300 ns 300 ns 11 thered RB to next Command 300 ns 300 ns 12 twHaX End of RD to next Command 300 ns 300 ns 13 truck End of RD to next Command 10 100 ns 300 ns 13 truck Carado Valid from DD (TA) 150 ns 150 ns 14 treLov Data Valid from StD (TA)	2	^t RHAX	A0/CS Hold after RD/INTA1		0		ns
5 NuHAX Ap/CS Hold after WR1 6 MuLWH WR Pulse Width 280 ns 7 towwh Data Setup to WR1 280 ns 8 twn(x) Data Setup to WR1 280 ns 9 tiLiH Interrupt Request Width (LOW) 0 ns 10 tV/LAL Cascade Setup Second or Third WA1 0 ns 11 transfer End of RD to next Command Second 300 ns 12 twninki End of RD to next Command Second 370 ns 13 transfer Data Vaiid from DVTAL 300 ns 14 transfer 10 100 ns 15 UHH Interrupt regut DA1 100 ns 16 transfer Transfer 10 100 ns 16 transfer Transfer 100 ns 200 ns 17 transfer Transfer Transfer 100 ns 200 ns	3	^t RLRH	RD Pulse Width		235		ns
6 twilling WR Pulse Width 7 town Data Bold after WR1 240 ns. 9 tull Interrupt Request Width (LOW) 0 ns. 10 toviaL Cascade Setup Second or Third NR1: (Slave On/y) 55 ns. 11 therap: Request Width (LOW) 300 ns. 12 toviaL Cascade Setup Second or Third NR1: (Slave On/y) 300 ns. 11 therap: End of WD to next Command 300 ns. 12 MvHRL End of WD to next Command 370 ns. 13 traicov Data Valid from 100/(Å): 1 10 100 ns. 14 traicov Data Valid from 100/(Å): 1 10 100 ns. 16 tul.cv Castade Valid from TRD or INTA i 1 10 100 ns. 18 traice or id to Valid to Valid Data 10 10 150 ns. 10 table Address 20 10 15 150 ns.	4	tAHWL	A_0/\overline{CS} Setup to $\overline{WR}_{\downarrow}$		0		ns
Totom Data Setup to WR: Data Setup to WR: Provide the setup of the setup of the setup second	5	twhax			0		ns
a UMHOX Data Hold after WR1 0 ns 9 ULUH Interrupt Request Width (LOW) 100 ns 10 ICVIAL Cascade Setup Second or Third (MTA1 M) 55 ns 11 Isried of RD to next Command 300 ns 12 IwHAL End of RD to next Command 300 ns 13 Isried of RD to next Command 300 ns 14 Isried of RD to next Command 300 ns 15 UHH Interrupt Reput Point Command 300 ns 16 Isried file Cascade Value MR first INTA1 10 100 ns 16 Isried file Cascade Value MR first INTA1 (Notes 1 and 2) 125 ns 17 Isried Bob Inactive from RD or INTA1 (Notes 1 and 2) 125 ns 18 Isried Multi All to Valid Data Notes: 1. Test Conditions: Voc = 4.5 V to 5.5 V VIL = 0.45 V, VIH = 2.4 V; VIH = 0.8 V, VOH = = 2.0 V 300 ns 10 Isried file Isried file Isried file	6	^t wLWH		I I I I I I I I I I I I I I I I I I I			ns
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	7	^t DVWH		(Note 1)			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		twhox					
10 CVIAL (Slave Only) 0 0 113 11 HaHAL End of RD to next Command 300 ns 12 WHAL End of WR to next Command 300 ns 13 HaLOV Data Valid from DO TAL 10 100 ns 14 UHOZ Data Float after D/RNH 10 100 ns 15 UHH Interrupt tight Dole 10 100 ns 16 HALCV Cased Value 10 100 ns 16 HALCV Cased Value 10 100 ns 17 HELE Cased Value 10 100 ns 18 HAHEH End value from RD1 or INTA1 (Notes 1 and 2) 125 ns 18 IAHEH End value from Stable Address 200 ns 200 ns 20 tcvbv Cascade Value to value data 100 100 ns 19 IAHOV Data Value from Stable Address 200 ns 300 ns 10 tcvbv Cascade Value of V	9	tjljh		L *	100		ns
12 WHRL End of WR to next Commun. 370 ns 13 HaLOV Data Valid from HDATAL 200 ns 14 HaHOZ Data Float atter D/INVit 10 100 ns 15 UHH Interport upput Daty 10 100 ns 16 HALCV Casedo Value m First INTAL 565 ns 17 HaLEL Under the First INTAL 565 ns 18 HaHEH Endo Inactive from RDL or INTAL (Notes 1 and 2) 125 ns 19 LAHDV Data Valid from Stable Address 200 ns 200 ns 20 tcvvv Caseade Valid to Valid Data 150 ns 300 ns Notes: 1. Test Condition: CL = 100 pF ± 20 pF. VIL = 0.45 V, VIH = 2.4 V; VOL = 0.8 V, VOH = = 2.0 V 300 ns 2. Test Condition: CL = 100 pF ± 20 pF. WR	10	tCVIAL			55		ns
TIMING RESPONSES 13 tRLDV Data Valid from 200/07(A) 14 tRHDZ Data Filoat after 00/07(A) 15 tJHH Interrupt triput 08y 16 tJALCV Casage Valuetine First INTAL 17 tRLEL Casage Valuetine First INTAL 18 tIRHEH Tobb Inactive from RD: or INTAL 18 tRHEH Tobb Inactive from RD: or INTAL 19 tAHDV Data Valid from Stable Address 20 tCVDV Casacade Valid to Valid Data Notes: 1. Test Conditions: V _{CC} = 4.5 V to 5.5 V V _{IL} = 0.45 V, V _{IH} = -400 μA 2. Test Condition: C _L = 100 pF ±20 pF. Test Condition: C _L = 100 pF ±20 pF.	11	^t RHRL			300		ns
13 IRLOV Data Valid from DD ITAL 200 ns 14 IRHOZ Data Float after D/INAt 10 100 ns 15 UHH Interrupt Uput Date 350 ns 16 IALCV Cased Value INTAL 350 ns 17 IRLEL Under stive from RD1 or INTAL 565 ns 18 IRHEH Data Valid from Stable Address 200 ns 20 LCVDV Cascade Valid to Valid Data 150 ns 19 IAHDV Data Valid from Stable Address 200 ns 20 LCVDV Cascade Valid to Valid Data 300 ns Notes: 1. Test Condition: $V_{CC} = 4.5$ V to 5.5 V VIL = 2.4 V; VOL = 0.8 V, VOH = = 2.0 V 300 ns 2. Test Condition: $C_L = 100$ pF ± 20 pF. Image: VOL = 2.2 m, IoH = -400 µA VIL = 2.2 m, IoH = -400 µA VIL = 2.4 V; WOL = 0.4 V, WHRL WF024761	12	1 _{WHRL}	End of WR to next Com		370		ns
14 trind Interrupt Data Float after D/INV1: 15 UHIH Interrupt Interrupt Data 16 tial.cv Case do Var, dm First INTA: 350 ns 17 trulet Case do Var, dm First INTA: 565 ns 17 trulet Case do Var, dm First INTA: 565 ns 18 trulet Case do Var, dm First INTA: 1000 ns 19 table Case do Var, dm First INTA: 150 ns 19 table Case do Var, dm Tor INTA: 150 ns 19 table Value from Stable Address 200 ns 20 tcvbv Case do Value to Value Data 300 ns Notes: 1. Test Condition: Cic = 0.45 V, Vin = 2.4 V; Vol = 0.8 V, Vol = = 2.0 V 300 ns 2. Test Condition: Cic = 100 pF ± 20 pF. Fit Tor PF ± 20 pF. WR WR WR24761	IMING	RESPONSES					
14 InHOZ Data Float after D/INN:: 15 UHIH Interrupt uput Day 16 ItaLCV Casa Value for FIG1 or INTA: 17 InLEL attention first INTA: 18 InHEH Data Value for RD: or INTA: 19 IAHDV Data Value from RD: or INTA: 10 100 ns 20 ICVDV Cascade Value for RD: or INTA: 19 IAHDV Data Value from RD: or INTA: 10 100 ns 20 ICVDV Cascade Value for Value Data Notes: 1. Test Conditions: Vice 4.5 V, 05.5 V VIL = 0.45 V, Vi. = 2.4 V; VOL = 0.8 V, VOH = = 2.0 V IOL = 2.2 mA, IOH = -400 µA 2. Test Condition: CL = 100 pF ± 20 pF. INTA WR WR WR WR WF024761	13	IRLOV	Data Valid from ADA TA			200	ns
15 UHIH Interrupt Apput Day 16 ItaLCV Casa VA, Am First INTA: 350 ns 16 ItaLCV Casa VA, Am First INTA: 565 ns 17 InEL Casa VA, Am First INTA: 565 ns 18 InHEH The Inactive from RD: or INTA: 10 125 ns 19 IAHOV Data Valid from Stable Address 200 ns 200 200 ns 20 ICVDV Casacade Valid to Valid Data Notes: 1. Test Conditions: Vac = 4.5 V to 5.5 V VIL = 0.45 V, VIH = 2.4 V; VOL = 0.8 V, VOH = = 2.0 V 300 ns Notes: 1. Test Condition: CL = 100 pF ± 20 pF. ID	14				10	100	ns
16 t_{IALCV} Case 0 V/2 + Vm First INTA1 (MARCH V) 565 ns 17 t_{IRLEL} Vector RD1 or INTA1 18 Intervector RD1 or INTA1 150 125 ns 18 t_{IRHEH} Data Valid from Stable Address 20 ICVDV Cascade Valid to Valid Data 200 ns Notes: 1. Test Conditions: V _{CC} = 4.5 V to 5.5 V V _{LL} = 0.45 V, V _H = 2.4 V; V _{OL} = 0.8 V, V _{OH} = = 2.0 V IOL = 2.2 mA, IOH = -400 μA 300 ns 2. Test Condition: C _L = 100 pF ± 20 pF. ITTA t_{RHRL} WF024761	15		Interrupt tott Deby			350	ns
17 InLEL Interview from RD: or INTA: (Notes 1 and 2) 125 ns 18 InHEH Interview from RD: or INTA: 150 ns 19 IAHDV Data Valid from Stable Address 200 ns 20 ICVDV Cascade Valid to Valid Data 300 ns Notes: 1. Test Conditions: $V_{CC} = 4.5$ V to 5.5 V $V_{IL} = 0.45$ V, $V_{IH} = 2.4$ V; $V_{OL} = 0.8$ V, $V_{OH} = = 2.0$ V $I_{OL} = 2.2$ RA, $I_{OH} = -400$ μ A 2. Test Condition: $C_L = 100$ pF ± 20 pF. RD INTA INTA INTA INTA Interview WR Interview WR Interview Interview WF024761	16		Castao Value om First INTA			565	ns
18 It HEH 100 Inactive from RD: or INTA: 150 ns 19 IAHDV Data Valid from Stable Address 200 150 ns 20 IcvDv Cascade Valid to Valid Data 300 ns 300 ns Notes: 1. Test Conditions: Vcc = 4.5 V to 5.5 V Ul_ = 0.45 V, Vl_ H = 2.4 V; Vol_ = 0.8 V, Vol_ = = 2.0 V IOL = 2.2 mA, IOH = -400 μ A 300 ns 300 ns 2. Test Condition: CL = 100 pF ±20 pF. Image: Condition to the test of the test of test	17			(Notes 1 and 2)		125	ns
19 IAHDV Data Valid from Stable Address 200 ns 20 ICVDV Cascade Valid to Valid Data 300 ns Notes: 1. Test Conditions: $V_{CC} = 4.5$ V to 5.5 V VIL = 0.45 V, VIH = 2.4 V; VOL = 0.8 V, VOH = = 2.0 V IOL = 2.2 mA, IOH = -400 μ A 2. Test Condition: $C_L = 100$ pF ± 20 pF. RD INTA INTA INTA INTA INTA WR INTA INTA INTA WF024761						150	ns
20 type Cascade Valid to Valid Data 300 ns Notes: 1. Test Conditions: V _{CC} = 4.5 V to 5.5 V V _L = 0.45 V, V _H = 2.4 V; V _{OL} = 0.8 V, V _{OH} = = 2.0 V I _{OL} = 2.2 mA, I _{OH} = -400 µA 300 ns 2. Test Condition: C _L = 100 pF ± 20 pF. F F F F		-				200	ns
Notes: 1. Test Conditions: $V_{CC} = 4.5 \text{ V}$ to 5.5 V $V_{IL} = 0.45 \text{ V}$, $V_{IH} = 2.4 \text{ V}$; $V_{OL} = 0.8 \text{ V}$, $V_{OH} = -2.0 \text{ V}$ $I_{OL} = 2.2 \text{ mA}$, $I_{OH} = -400 \text{ µA}$ 2. Test Condition: $C_L = 100 \text{ pF} \pm 20 \text{ pF}$.						300	ns
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Other Timing (Military)					VF024761		
			Other Timing (M	lintary)			