



2Mx16 Flash MODULE, SMD 5962-97610

FEATURES

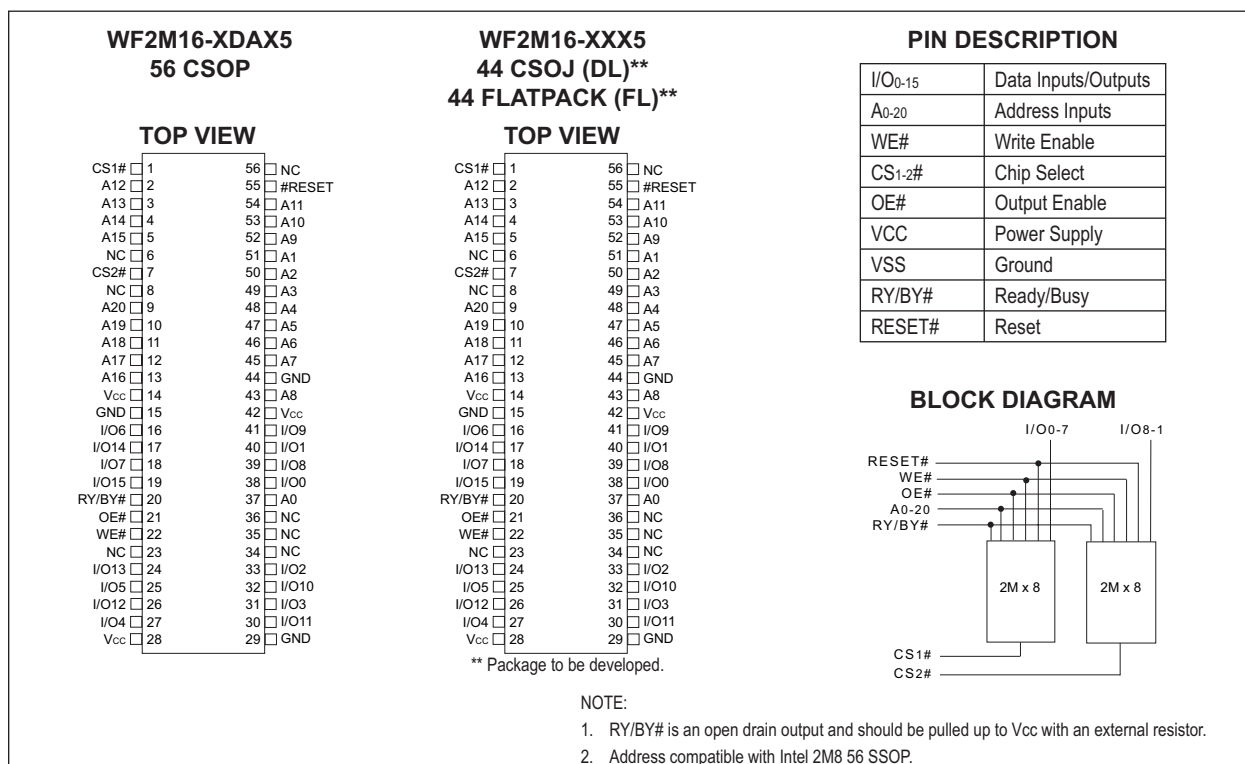
- Access Times of 90, 120, 150ns
- Packaging:
 - 56 lead, Hermetic Ceramic, 0.520" CSOP (Package 207). Fits standard 56 SSOP footprint.
 - 44 pin Ceramic SOJ (Package 102)**
 - 44 lead Ceramic Flatpack (Package 208)**
- Sector Architecture
 - 32 equal size sectors of 64KBytes each
 - Any combination of sectors can be erased. Also supports full chip erase.
- Minimum 100,000 Write/Erase Cycles Minimum
- Organized as 2Mx16; User Configurable as 2 x 2Mx8
- Commercial, Industrial, and Military Temperature Ranges
- 5 Volt Read and Write. 5V ± 10% Supply.
- Low Power CMOS
- Data# Polling and Toggle Bit feature for detection of program or erase cycle completion.
- Supports reading or programming data to a sector not being erased.
- Built-in Decoupling Caps and Multiple Ground Pins for Low Noise Operation.
- RESET# pin resets internal state machine to the read mode.
- Ready/Busy (RY#/BY#) output for detection of program or erase cycle completion.
- Multiple Ground Pins for Low Noise Operation

* This product is under development, is not qualified or characterized and is subject to change without notice.

** Package to be developed.

Note: For programming information refer to Flash Programming 16M5 Application Notes.

FIGURE 1 – PIN CONFIGURATIONS





ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Ratings	Unit
Voltage on Any Pin Relative to V _{SS}	V _T	-2.0 to +7.0	V
Power Dissipation	P _T	8	W
Storage Temperature	T _{STG}	-65 to +125	°C
Short Circuit Output Current	I _{OS}	100	mA
Data Retention (Mil Temp)		20	years
Endurance — write/erase cycles	(Mil Temp)	100,000 min.	cycles

CAPACITANCE

(T_A = +25°C)

Parameter	Symbol	Conditions	Max	Unit
OE# capacitance	C _{OE}	V _{IN} = 0V, f = 1.0 MHz	25	pF
WE# capacitance	C _{WE}	V _{IN} = 0V, f = 1.0 MHz	25	pF
CS# capacitance	C _{CS}	V _{IN} = 0V, f = 1.0 MHz	15	pF
Data I/O capacitance	C _{I/O}	V _{I/O} = 0V, f = 1.0 MHz	15	pF
Address input capacitance	C _{AD}	V _{IN} = 0V, f = 1.0 MHz	25	pF

This parameter is guaranteed by design but not tested.

RECOMMENDED DC OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	V _{CC}	4.5	5.0	5.5	V
Ground	V _{SS}	0	0	0	V
Input High Voltage	V _{IH}	2.0	–	V _{CC} + 0.5	V
Input Low Voltage	V _{IL}	-0.5	–	+0.8	V
Operating Temperature (Mil.)	T _A	-55	–	+125°C	°C
Operating Temperature (Ind.)	T _A	-40	–	+85	°C

DC CHARACTERISTICS - CMOS COMPATIBLE

V_{CC} = 5.0V, V_{SS} = 0V, -55°C ≤ T_A ≤ +125°C

Parameter	Symbol	Conditions	Min	Max	Unit
Input Leakage Current	I _{LI}	V _{CC} = 5.5, V _{IN} = GND to V _{CC}		10	μA
Output Leakage Current	I _{LO}	V _{CC} = 5.5, V _{IN} = GND to V _{CC}		10	μA
V _{CC} Active Current for Read (1)	I _{CC1}	CS# = V _{IL} , OE# = V _{IH} , f = 5MHz		80	mA
V _{CC} Active Current for Program or Erase (2)	I _{CC2}	CS# = V _{IL} , OE# = V _{IH}		120	mA
V _{CC} Standby Current	I _{CC3}	V _{CC} = 5.5, CS# = V _{IH} , f = 5MHz, RESET# = V _{CC} ± 0.3V		4.0	mA
Output Low Voltage	V _{OL}	I _{OL} = 12.0 mA, V _{CC} = 4.5		0.45	V
Output High Voltage	V _{OH}	I _{OH} = -2.5 mA, V _{CC} = 4.5	0.85xV _{CC}		V
Low V _{CC} Lock-Out Voltage	V _{LKO}		3.2	4.2	V

NOTES:

- The I_{CC} current listed includes both the DC operating current and the frequency dependent component (@ 5MHz). The frequency component typically is less than 2mA/MHz, with OE# at V_{IH}.
- I_{CC} active while Embedded Algorithm (program or erase) is in progress.
- DC test conditions V_{IL} = 0.3V, V_{IH} = V_{CC} - 0.3V



AC Characteristics – Write/Erase/Program Operations - WE# Controlled

V_{CC} = 5.0V, V_{SS} = 0V, -55°C ≤ T_A ≤ +125°C

Parameter	Symbol		-90		-120		-150		Unit
			Min	Max	Min	Max	Min	Max	
Write Cycle Time	t _{AVAV}	t _{WC}	90		120		150		ns
Chip Select Setup Time	t _{ELWL}	t _{CS}	0		0		0		ns
Write Enable Pulse Width	t _{WLWH}	t _{WP}	45		50		50		ns
Address Setup Time	t _{AVWL}	t _{AS}	0		0		0		ns
Data Setup Time	t _{DVWH}	t _{DS}	45		50		50		ns
Data Hold Time	t _{WHDX}	t _{DH}	0		0		0		ns
Address Hold Time	t _{WLAX}	t _{AH}	45		50		50		ns
Write Enable Pulse Width High	t _{WHWL}	t _{WPH}	20		20		20		ns
Duration of Byte Programming Operation (1)	t _{WHWH1}			300		300		300	μs
Sector Erase (2)	t _{WHWH2}			15		15		15	sec
Read Recovery Time before Write	t _{GHWL}		0		0		0		μs
V _{CC} Setup Time	t _{VCS}		50		50		50		μs
Chip Programming Time				44		44		44	sec
Chip Erase Time (3)				256		256		256	sec
Output Enable Hold Time (4)		t _{OEHL}	10		10		10		ns
RESET# Pulse Width		t _{RP}	500		500		500		ns

NOTES:

1. Typical value for t_{WHWH1} is 7μs.
2. Typical value for t_{WHWH2} is 1sec.
3. Typical value for Chip Erase Time is 32sec.
4. For Toggle and Data Polling.

AC CHARACTERISTICS – READ-ONLY OPERATIONS

V_{CC} = 5.0V, V_{SS} = 0V, -55°C ≤ T_A ≤ +125°C

Parameter	Symbol		-90		-120		-150		Unit
			Min	Max	Min	Max	Min	Max	
Read Cycle Time	T _{AVAV}	T _{RC}	90		120		150		ns
Address Access Time	T _{AVQV}	T _{ACC}		90		120		150	ns
Chip Select Access Time	T _{ELQV}	T _{CE}		90		120		150	ns
Output Enable to Output Valid	T _{GLQV}	T _{OE}		40		50		55	ns
Chip Select High to Output High Z (1)	T _{EHQZ}	T _{DF}		20		30		35	ns
Output Enable High to Output High Z (1)	T _{GHQZ}	T _{DF}		20		30		35	ns
Output Hold from Addresses, CS# or OE# Change, whichever is First	T _{AXQX}	T _{OH}	0		0		0		ns
RESET# Low to Read Mode (1)		T _{READY}		20		20		20	μs

1. Guaranteed by design, not tested.



AC CHARACTERISTICS – WRITE/ERASE/PROGRAM OPERATIONS, CS# CONTROLLED

V_{CC} = 5.0V, V_{SS} = 0V, -55°C ≤ T_A ≤ +125°C

Parameter	Symbol		-90		-120		-150		Unit
			Min	Max	Min	Max	Min	Max	
Write Cycle Time	t _{AVAV}	t _{WC}	90		120		150		ns
Write Enable Setup Time	t _{WLEL}	t _{WS}	0		0		0		ns
Chip Select Pulse Width	t _{LELH}	t _{CP}	45		50		50		ns
Address Setup Time	t _{AVEL}	t _{AS}	0		0		0		ns
Data Setup Time	t _{DVEH}	t _{DS}	45		50		50		ns
Data Hold Time	t _{EHDX}	t _{DH}	0		0		0		ns
Address Hold Time	t _{ELAX}	t _{AH}	45		50		50		ns
Chip Select Pulse Width High	t _{EHEL}	t _{CPH}	20		20		20		ns
Duration of Byte Programming Operation (1)	t _{WHWH1}			300	300		300		μs
Sector Erase Time (2)	t _{WHWH2}			15	15		15		sec
Read Recovery Time	t _{GH}		0		0		0		μs
Chip Programming Time				44	44		44		sec
Chip Erase Time (3)				256	256		256		sec
Output Enable Hold Time (4)		t _{OEH}	10		10		10		ns

NOTES:

1. Typical value for t_{WHWH1} is 7μs.
2. Typical value for t_{WHWH2} is 1sec.
3. Typical value for Chip Erase Time is 32sec.
4. For Toggle and Data Polling.

FIGURE 2 – AC TEST CIRCUIT

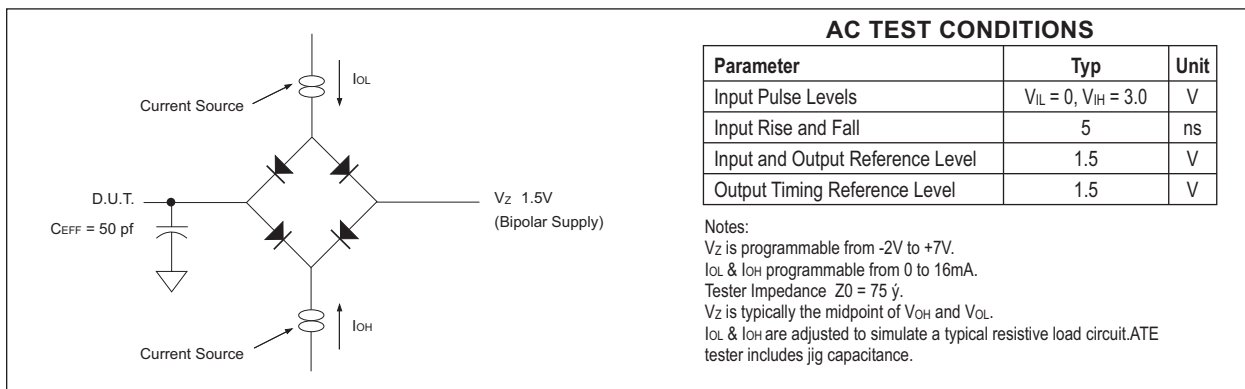


FIGURE 3 – RESET TIMING DIAGRAM

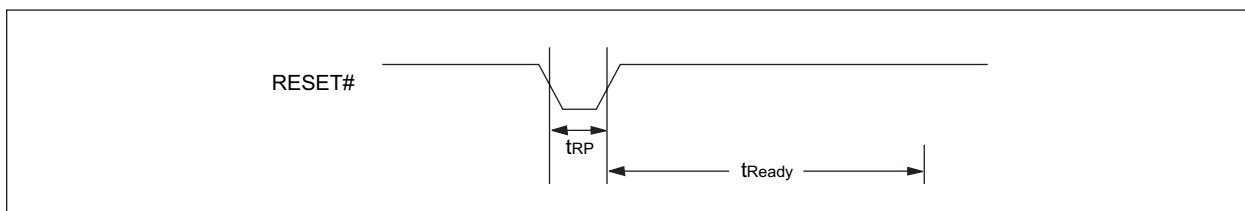




FIGURE 3 – AC WAVEFORMS FOR READ OPERATIONS

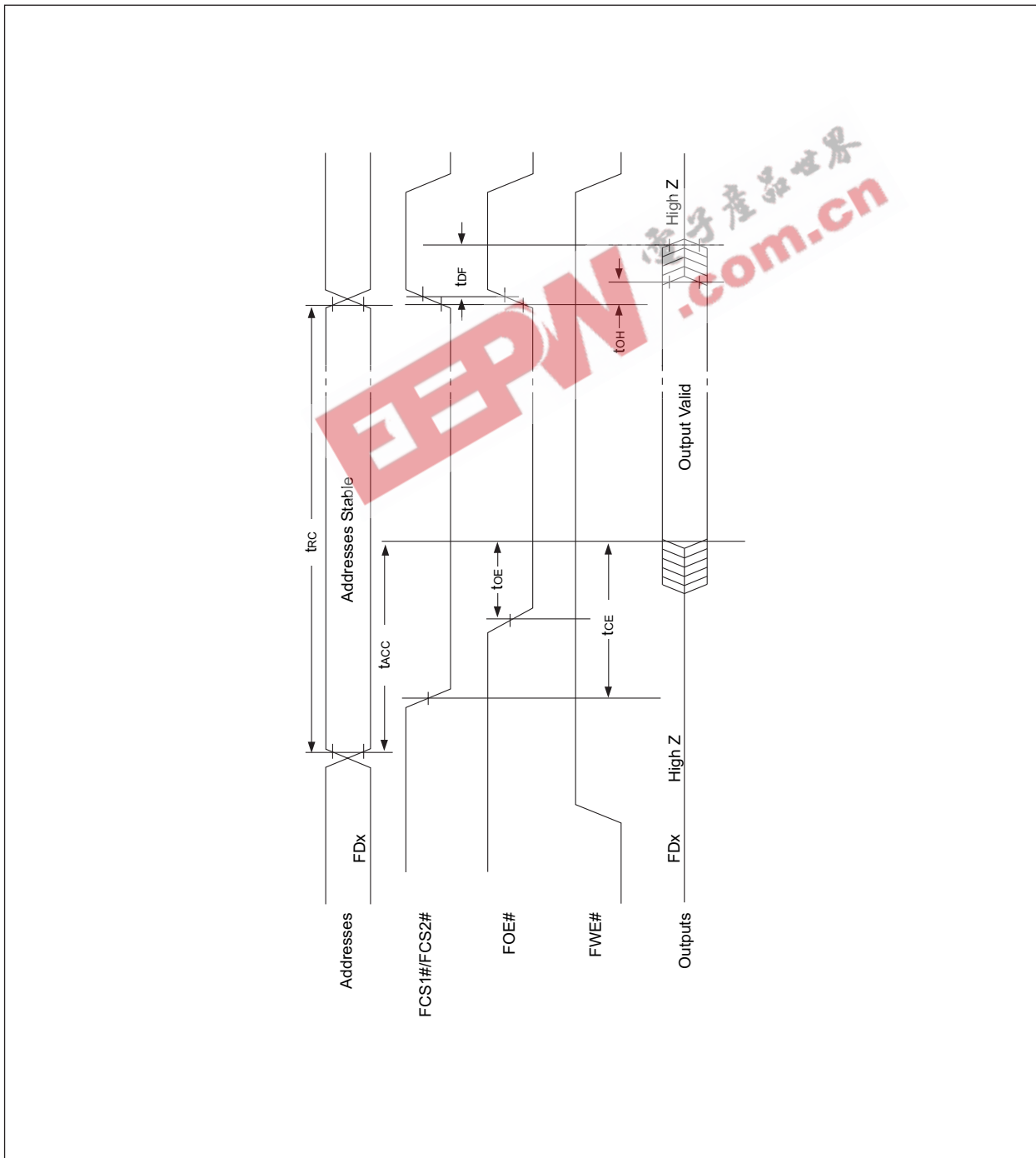
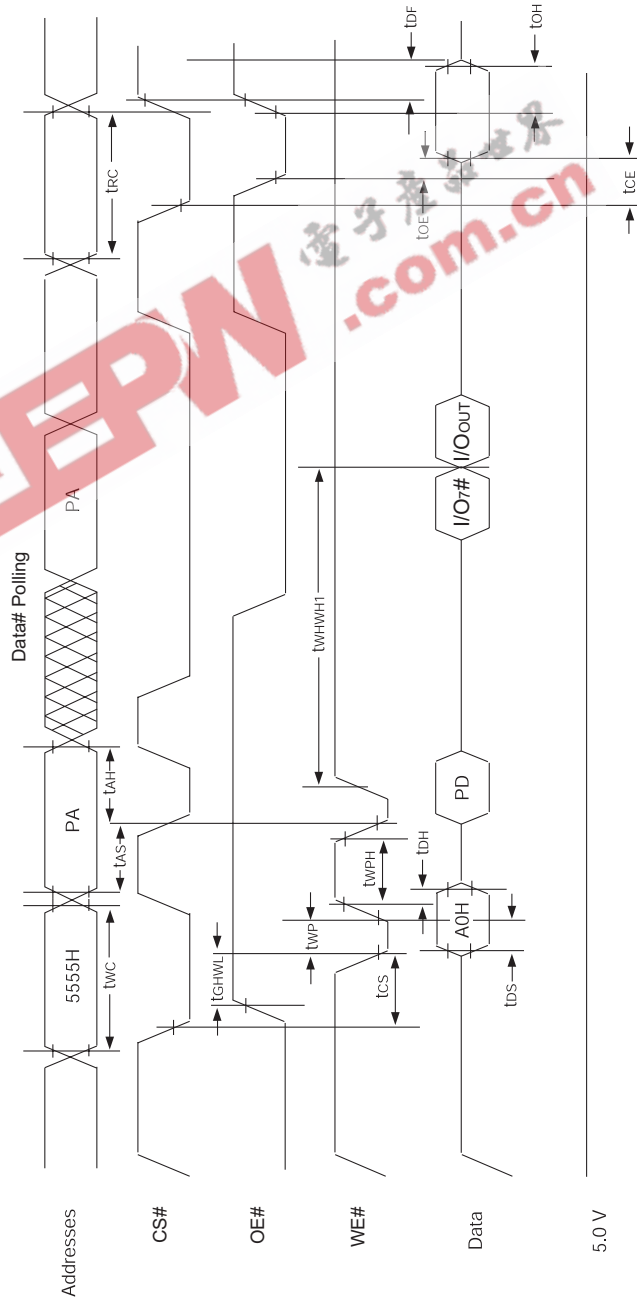




FIGURE 4 – WRITE/ERASE/PROGRAM OPERATION, WE# CONTROLLED

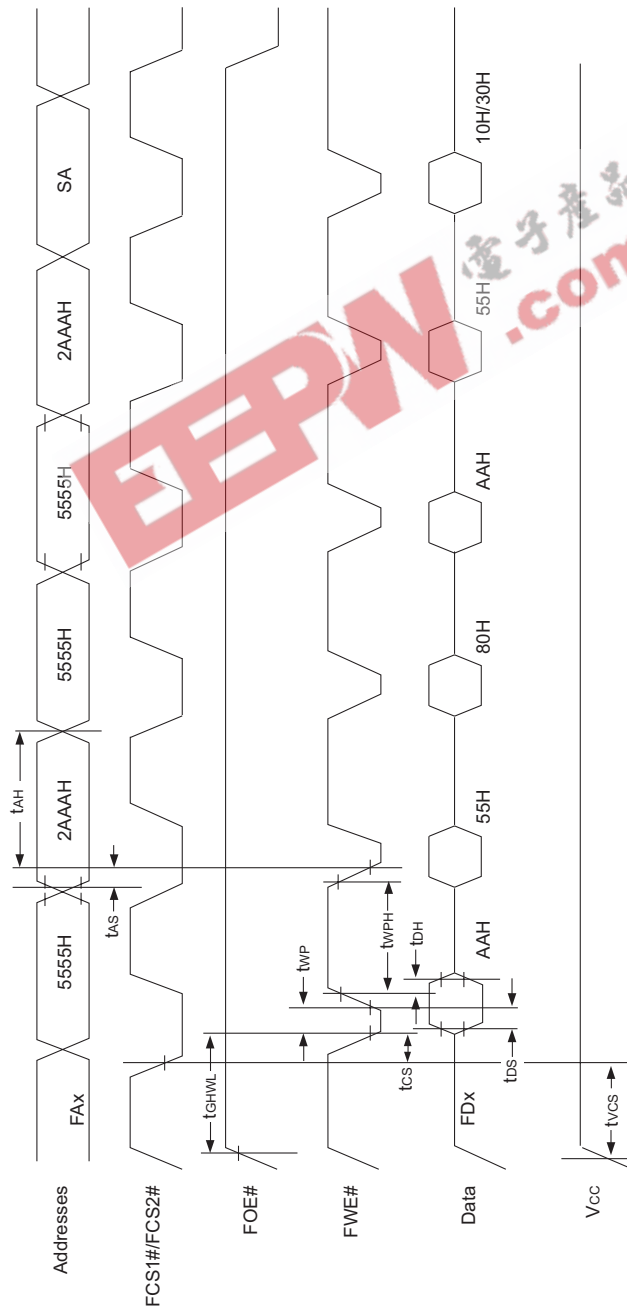


NOTES:

- 1. PA is the address of the memory location to be programmed.
- 2. PD is the data to be programmed at byte address.
- 3. D₇# is the output of the complement of the data written to the device.
- 4. D_{out} is the output of the data written to the device.
- 5. Figure indicates last two bus cycles of four bus cycle sequence.



FIGURE 5 – AC WAVEFORMS CHIP/SECTOR ERASE OPERATIONS



NOTE:

- 1. SA is the sector address for Sector Erase.



FIG. 6 – AC WAVEFORMS FOR DATA# POLLING DURING EMBEDDED ALGORITHM OPERATIONS

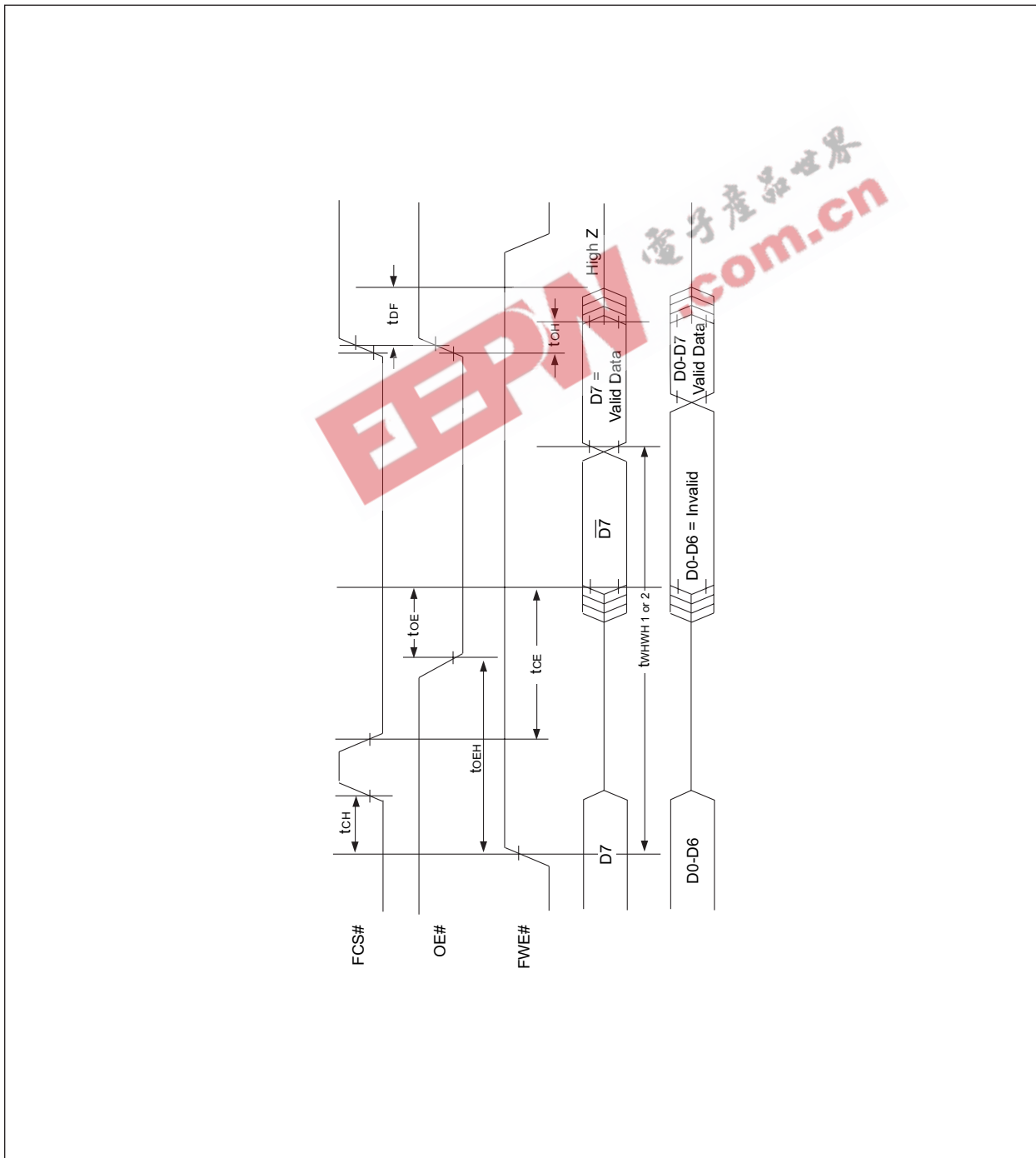
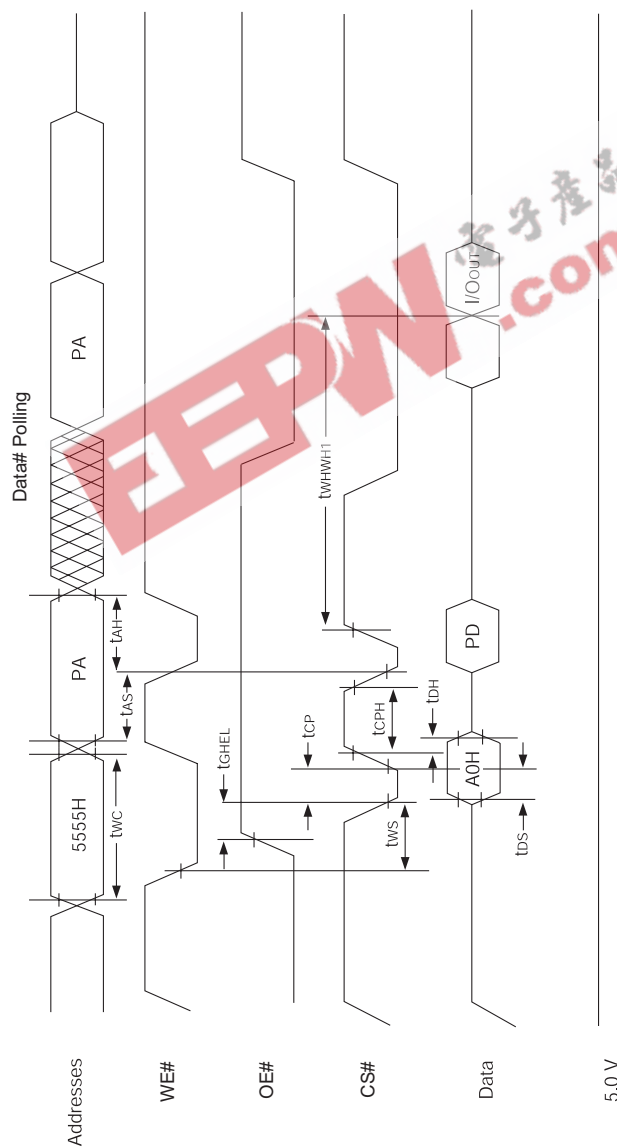




FIGURE 7 – ALTERNATE CS# CONTROLLED PROGRAMMING OPERATION TIMINGS

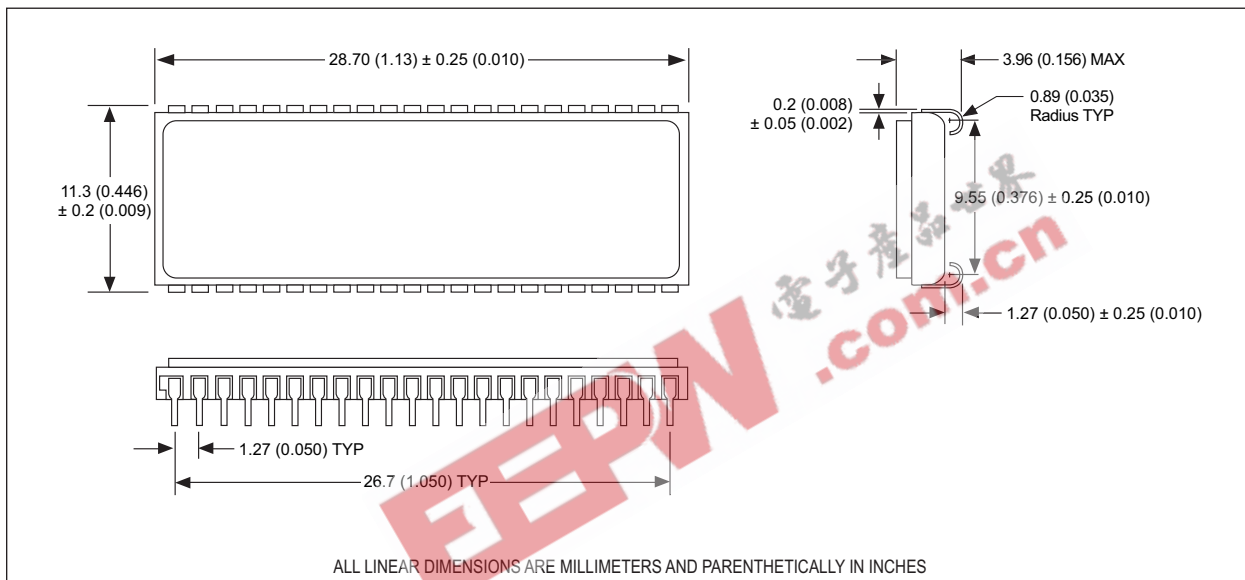


NOTES:

- 1. PA represents the address of the memory location to be programmed.
- 2. PD represents the data to be programmed at byte address.
- 3. D7# is the output of the complement of the data written to the device.
- 4. DOUT is the output of the data written to the device.
- 5. Figure indicates the last two bus cycle sequence.

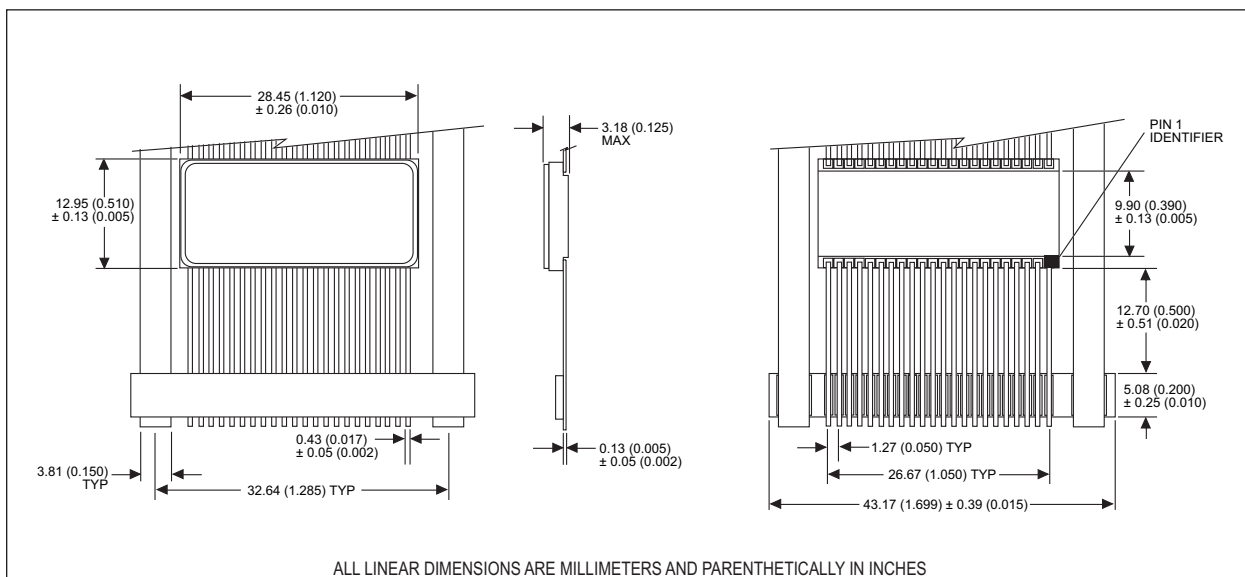


PACKAGE 102: 44 LEAD, CERAMIC SOJ**



** Package to be developed.

PACKAGE 208: 44 LEAD, CERAMIC FLAT PACK**



** Package to be developed.



PACKAGE 207: 56 LEAD, CERAMIC SOP*

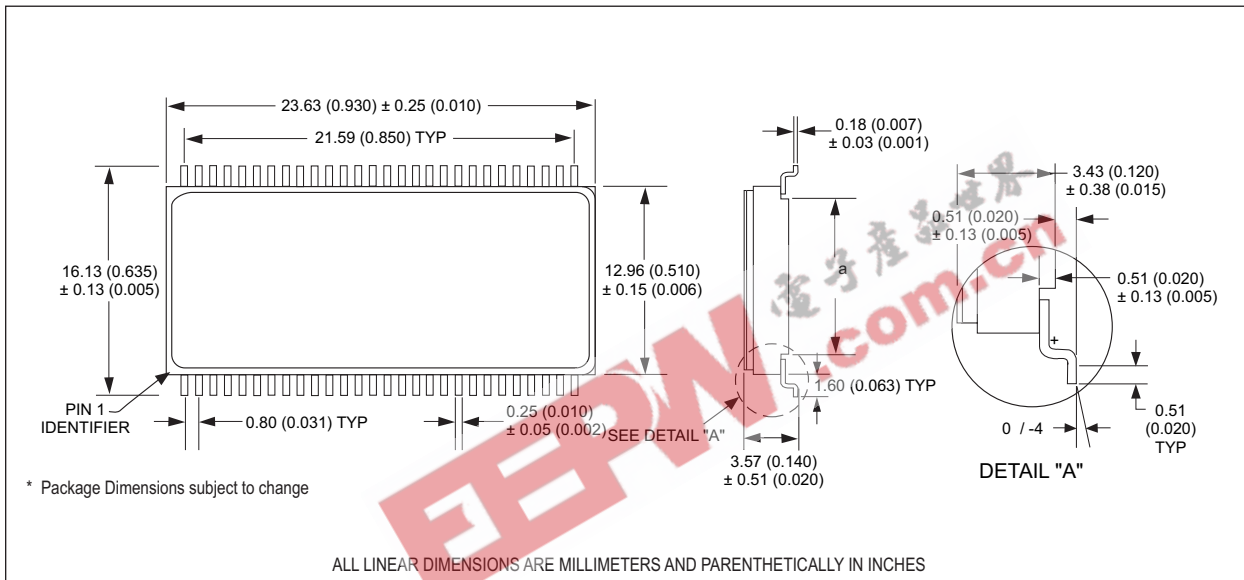
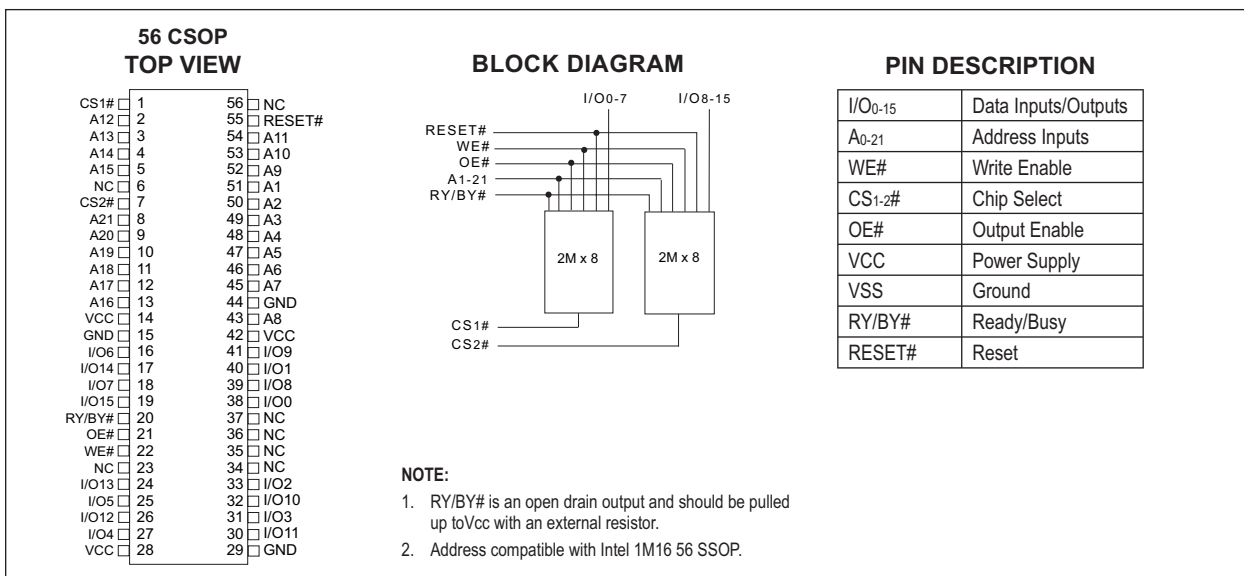
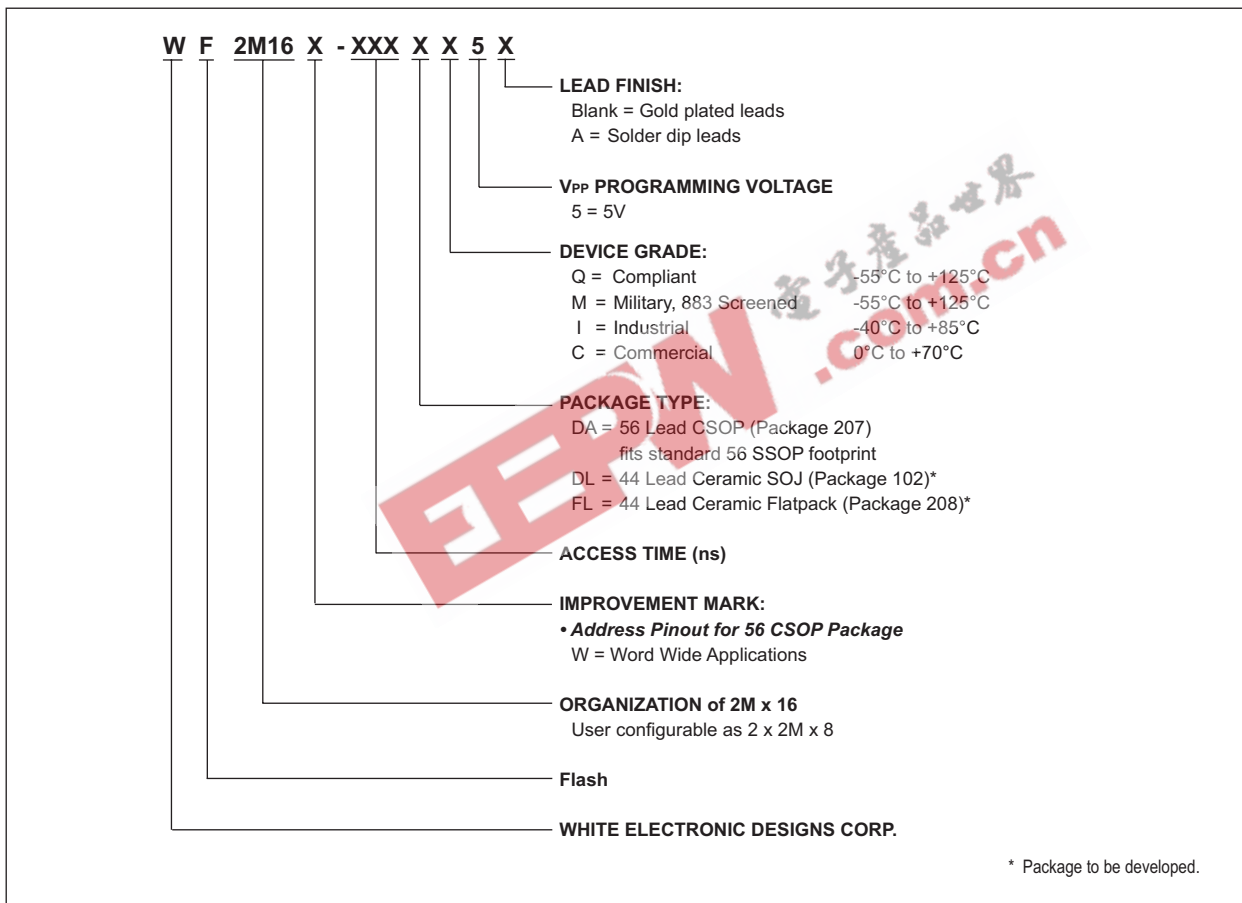


FIGURE 8 – ALTERNATE PIN CONFIGURATION FOR WF2M16W-XDAX5





ORDERING INFORMATION



DEVICE TYPE	SECTOR SIZE	SPEED	PACKAGE	SMD NO.
2M x 16 Flash MCP		150ns		5962-97610 04HXX
2M x 16 Flash MCP		120ns		5962-97610 05HXX
2M x 16 Flash MCP		90ns		5962-97610 06HXX