

OKI Semiconductor

MSM6353/6353L-xx

Built-in 8 or 5 bit Serial Port 4-Bit Microcontroller

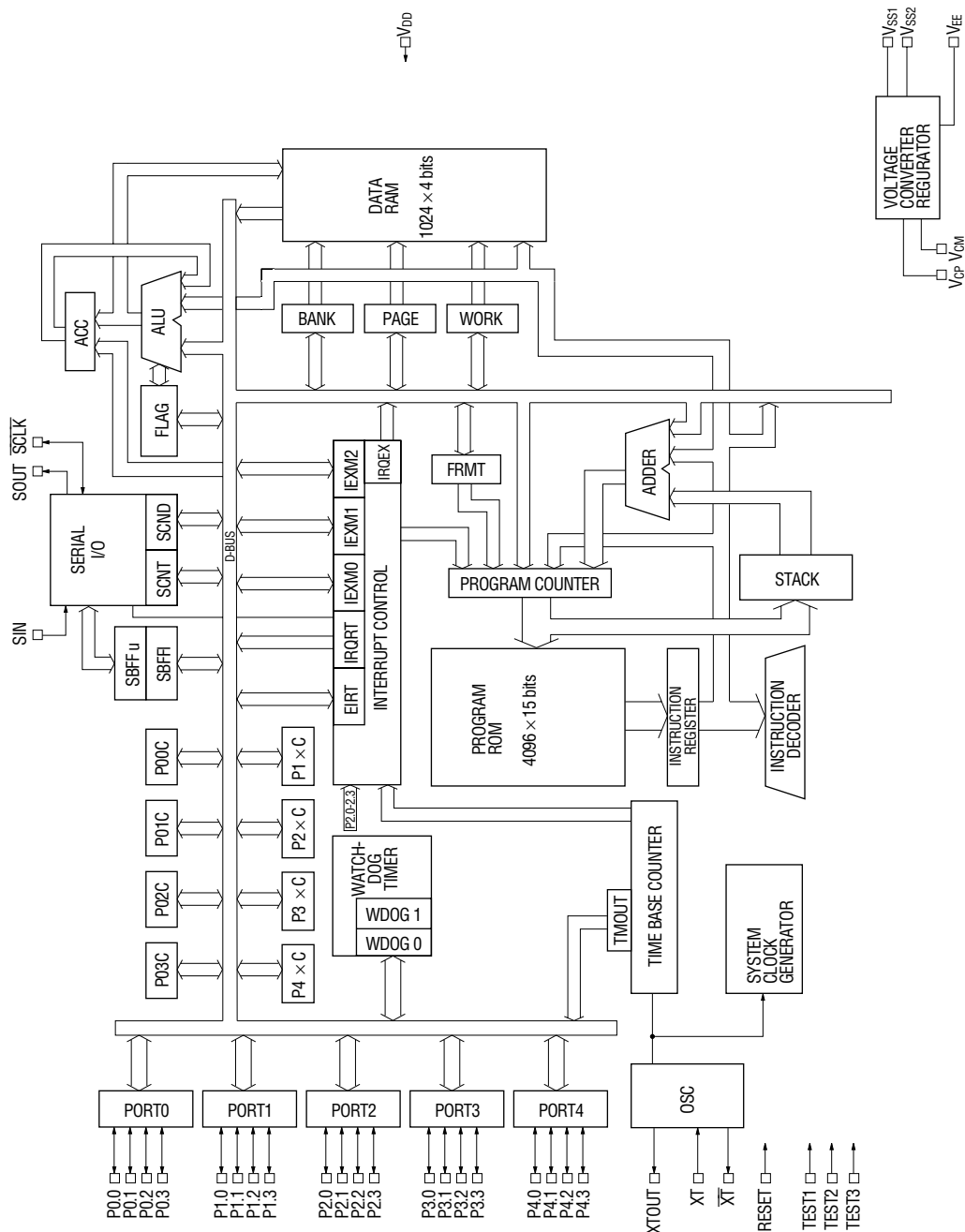
GENERAL DESCRIPTION

The MSM6353/6353L is a low-power 4-bit microcontroller manufactured in CMOS process technology. It is best suited for the control of battery-driven equipment. The built-in 8-bit or 5-bit serial port provides a data communication capability with external apparatus.

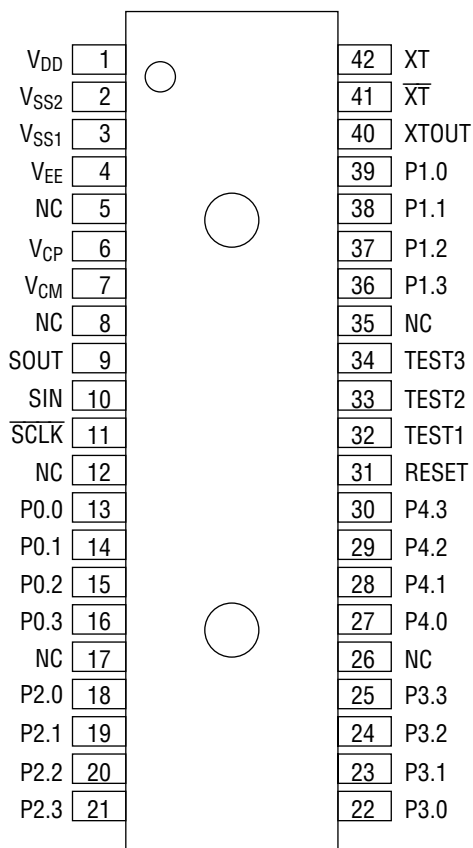
FEATURES

- Low power consumption
 - Large capacity memory
 - ROM : 4096 words $\times$ 15 bits
 - RAM : 1024 words $\times$ 4 bits
 - I/O port
 - Input-output port : 5 ports $\times$ 4 bits (input or output can be specified for each port)
 - 1.5 V single-power-supply operation (MSM6353)
Can be changed to 3.0 V specification by mask option (MSM6353L).
 - Built-in watchdog timer
 - Built-in serial port of 8 bits or 5 bits (asynchronous)
 - 32.768 kHz built-in crystal oscillator circuit
 - Package options:
 - 42-pin shrink DIP (SDIP42-P-600-1.78) (Product name: MSM6353-xxSS, MSM6353L-xxSS)
 - 44-pin plastic QFP (QFP44-P-910-0.80-K) (Product name: MSM6353-xxGS-K, MSM6353L-xxGS-K)
(QFP44-P-910-0.80-2K) (Product name: MSM6353-xxGS-2K, MSM6353L-xxGS-2K)
- xx indicates the code number.

BLOCK DIAGRAM



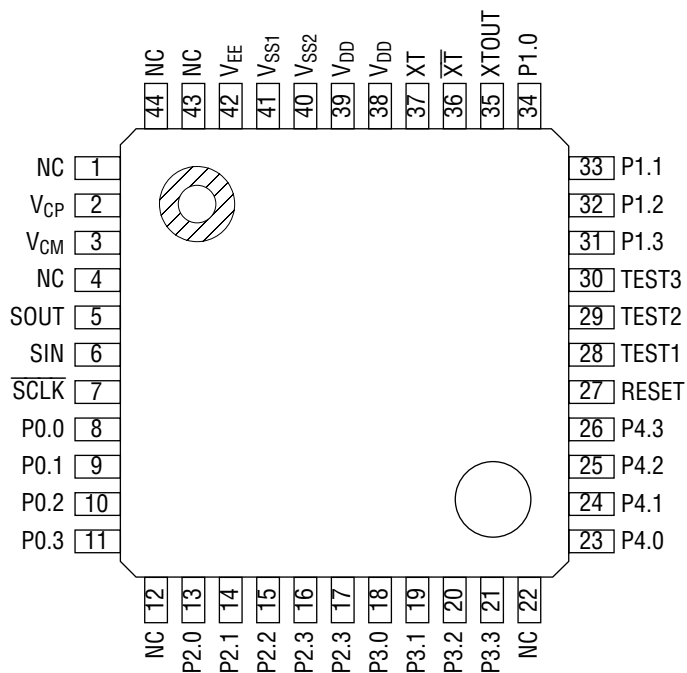
PIN CONFIGURATION (TOP VIEW)



NC : No-connection pin

42-Pin Shrink DIP

PIN CONFIGURATION (TOP VIEW) (Continued)



NC : No-connection pin

44-Pin Plastic QFP

ABSOLUTE MAXIMUM RATINGS (MSM6353, 1.5 V) $V_{DD}=0\text{ V}$ ($V_{SS1}=V_{SS2}=\text{battery voltage}$)

Parameter	Symbol	Condition	Rating	Unit
Power Supply Voltage	V_{SS1}	$T_a=25^\circ\text{C}$	-6.0 to +0.3	V
Input Voltage	V_{IN}		$V_{SS}-0.3$ to $V_{SS}+0.3$	
Output Voltage	V_{OUT}		$V_{SS}-0.3$ to $V_{SS}+0.3$	
Storage Temperature	T_{STG}	—	-55 to +125	$^\circ\text{C}$

RECOMMENDED OPERATING CONDITIONS (MSM6353, 1.5 V) $V_{DD}=0\text{ V}$ ($V_{SS1}=V_{SS2}=\text{battery voltage}$)

Parameter	Symbol	Condition	Range	Unit
Operating Voltage	V_{op}	BUF=Fixed to "0"	-1.25 to -1.75	V
Operating Temperature	T_{op}	—	-20 to +70	$^\circ\text{C}$
Operating Frequency	f_{OSC}	—	32.768	kHz

ELECTRICAL CHARACTERISTICS (MSM6353, 1.5 V)**DC Characteristics** $(V_{DD}=0\text{ V}, V_{SS1}=V_{SS2}=-1.5\text{ V (battery voltage)}, f_{OSC}=32,768\text{ Hz}, C_X=35\text{ pF}, T_a=25^\circ\text{C})$

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Applied Pin
Current Consumption	I_{DD}	*1 *2	—	3.0	—	μA	—
Oscillation Start Voltage	$-V_{OSC}$	Within 2 sec.	—	—	1.4	V	—
Output Current 1	$-I_{OH1}$	$V_O=-0.5\text{ V}$	150	—	—	μA	PORT0 to PORT4*3 SOUT, SCLK, XTOUT
	I_{OL1}	$V_O=-1.0\text{ V}$	150	—	—		
Output Current 2	$-I_{OH2}$	$V_O=-0.5\text{ V}$	7	—	—	μA	BD
	I_{OL2}	$V_O=-1.0\text{ V}$	20	—	—		
Input Current 1	$-I_{IH1}$	$V_I=0\text{ V}$, input state, with pull-down resistor	75	150	300	μA	PORT0 to PORT4
Input Leakage Current	$ I_{IL2} $	$V_I=0\text{ V}, -1.5\text{ V}$, input state, without pull-down resistor	—	—	1	μA	PORT0 to PORT4 SCLK, SIN, SOUT
Input Current 3	$-I_{IL3}$	$V_I=0\text{ V}$, with pull-down resistor	—	4	—	μA	RESET
Input Voltage	$-V_{IH}$	—	—	—	0.3	V	All input pins
	$-V_{IL}$	—	1.2	—	—		

*1 This value depends on program.

*2 Backup flag (BUF)=fixed to "0".

*3 PORT0=P0.0-P0.3, PORT1=P1.0-P1.3, PORT2=P2.0-P2.3, PORT3=P3.0-P3.3, PORT4=P4.0-P4.3.

ABSOLUTE MAXIMUM RATINGS (MSM6353L, 3.0 V) $V_{DD}=0\text{ V}$ ($V_{SS1}=V_{SS2}$ =battery voltage)

Parameter	Symbol	Condition	Rating	Unit
Power Supply Voltage	V_{SS1}	$T_a=25^\circ\text{C}$	-6.0 to +0.3	V
Input Voltage	V_{IN}		$V_{SS}-0.3$ to $V_{SS}+0.3$	
Output Voltage	V_{OUT}		$V_{SS}-0.3$ to $V_{SS}+0.3$	
Storage Temperature	T_{STG}	—	-55 to +125	$^\circ\text{C}$

RECOMMENDED OPERATING CONDITIONS (MSM6353L, 3.0 V) $V_{DD}=0\text{ V}$ ($V_{SS1}=V_{SS2}$ =battery voltage)

Parameter	Symbol	Condition	Range	Unit
Operating Voltage	V_{OP}	BUF=Fixed to "1"	-2.2 to -3.5	V
Operating Temperature	T_{OP}	—	-20 to +70	$^\circ\text{C}$
Operating Frequency	f_{OSC}	—	32.768	kHz

ELECTRICAL CHARACTERISTICS (MSM6353L, 3.0 V)**DC Characteristics** $(V_{DD}=0\text{ V}, V_{SS1}=V_{SS2}=-3.0\text{ V (battery voltage)}, f_{OSC}=32,768\text{ Hz}, C_X=35\text{ pF}, T_a=25^\circ\text{C})$

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Applied Pin
Current Consumption	I_{DD}	*1 *2	—	3.0	—	μA	—
Oscillation Start Voltage	$-V_{OSC}$	Within 2 sec.	—	—	2.4	V	—
Output Current 1	$-I_{OH1}$	$V_O=-0.5\text{ V}$	500	—	—	μA	PORT0 to PORT4*3 SOUT, SCLK, XTOUT
	I_{OL1}	$V_O=-2.5\text{ V}$	500	—	—		
Output Current 2	$-I_{OH2}$	$V_O=-0.5\text{ V}$	7	—	—	μA	BD
	I_{OL2}	$V_O=-2.5\text{ V}$	20	—	—		
Input Current 1	$-I_{IH1}$	$V_I=0\text{ V}$, input state, with pull-down resistor	150	300	600	μA	PORT0 to PORT4
Input Leakage Current	$ I_{IL2} $	$V_I=0\text{ V}, -3\text{ V}$, input state, without pull-down resistor	—	—	1	μA	PORT0 to PORT4 SCLK, SIN, SOUT
Input Current 3	$-I_{IL3}$	$V_I=0\text{ V}$, with pull-down resistor	—	25	—	μA	RESET
Input Voltage	$-V_{IH}$	—	—	—	0.5	V	All input pins
	$-V_{IL}$	—	2.5	—	—		

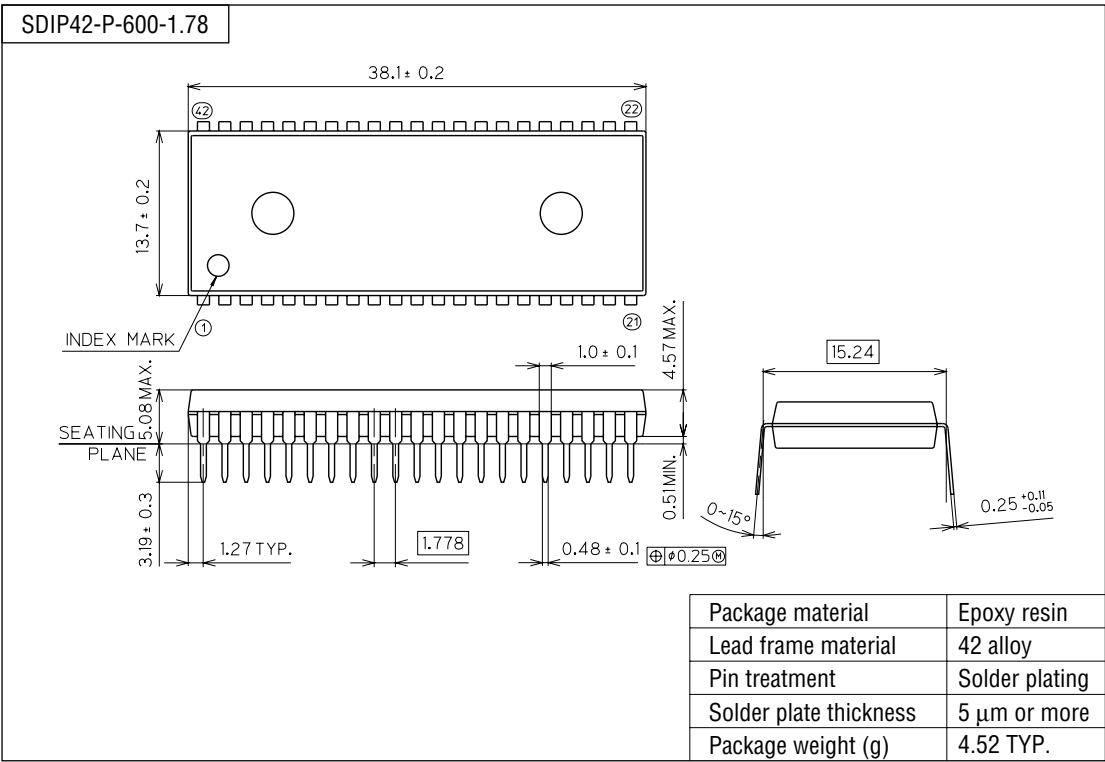
*1 This value depends on program.

*2 Backup flag (BUF)=fixed to "1".

*3 PORT0=P0.0-P0.3, PORT1=P1.0-P1.3, PORT2=P2.0-P2.3, PORT3=P3.0-P3.3, PORT4=P4.0-P4.3.

PACKAGE DIMENSIONS

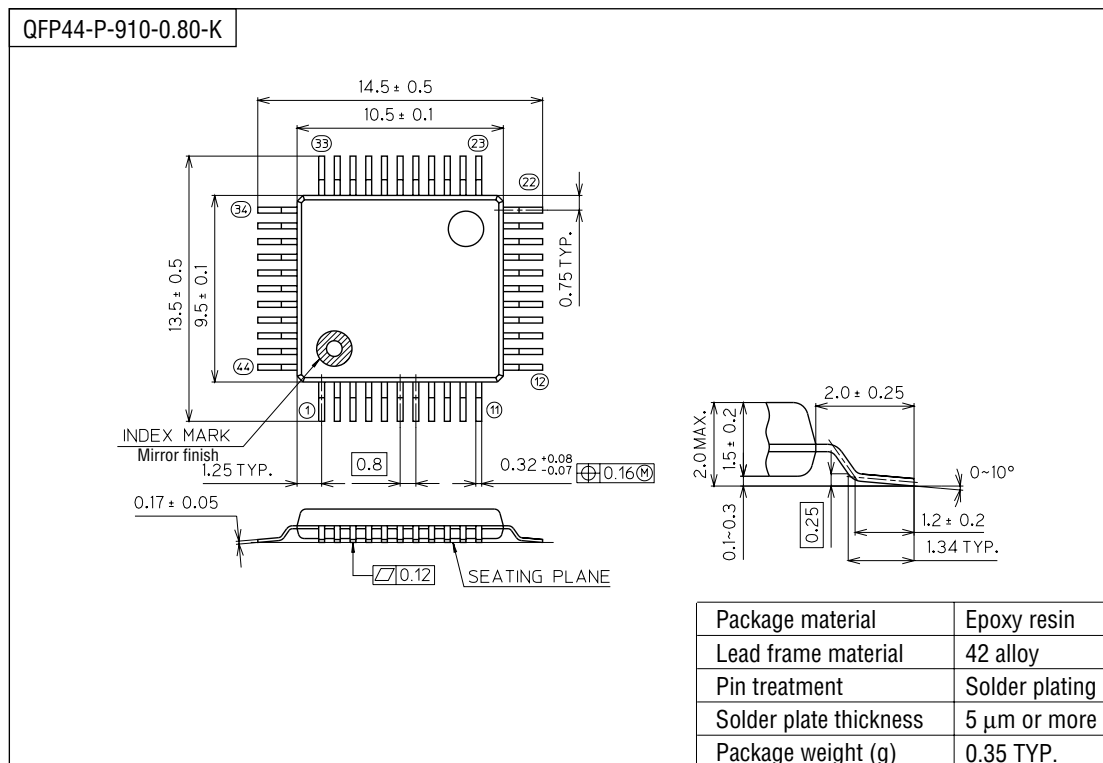
(Unit : mm)



Notes for Mounting the Surface Mount Type Package

The SOP, QFP, TSOP, SOJ, QFJ (PLCC), SHP and BGA are surface mount type packages, which are very susceptible to heat in reflow mounting and humidity absorbed in storage. Therefore, before you perform reflow mounting, contact Oki's responsible sales person for the product name, package name, pin number, package code and desired mounting conditions (reflow method, temperature and times).

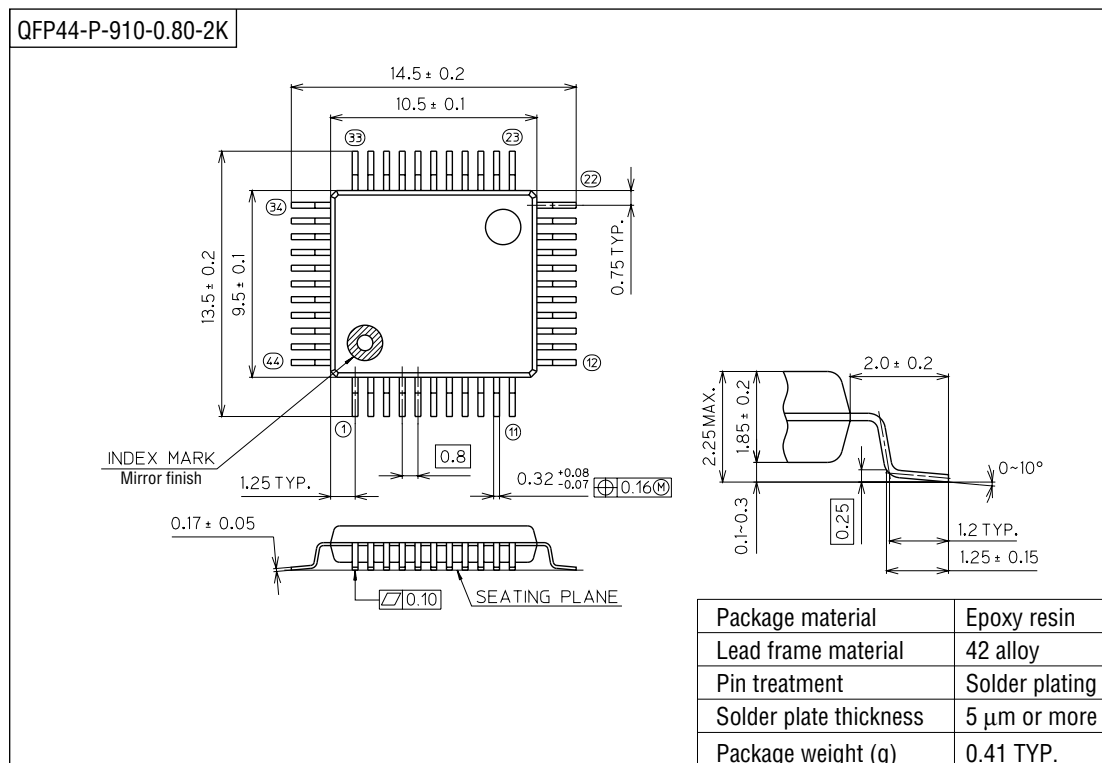
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