

### 2.1.1.2 System Parameters in Non-volatile Storage (NVS)

Since the LMX9838 is ROM based, all parameters used during a session will be stored in RAM and would be lost after power-down. For bluetooth operation as well as for internal configuration the LMX9838 has a number of System Parameters (Section 2.2), which contain parameters mandatory for bluetooth operation (e.g. Bluetooth Device Address (BD\_Addr)) as well as configuration values for the LMX9838. See Section 2.2 for a complete list of parameters.

To avoid reconfiguration of the LMX9838 on each power-up, all System Parameters (Section 2.2) are stored in the internal EEPROM. The LMX9838 automatically stores changed parameters within the EEPROM and restores them after boot-up and reset.

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**NOTE: NEVER DELETE THE INTERNAL EEPROM.** The EEPROM contains important information such as the BD address which should never be changed. If the module does not work properly anymore you can use the "Restore Factory Settings" command (Section 7.2.18.5) to reset the EEPROM content to a known good state.

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### 2.1.1.3 Clock Source

The LMX9838 includes an internal 13 MHz crystal, already tuned to give the optimal RF performances.

### 2.1.1.4 Audio Codec / DSP

As mentioned before, the LMX9838 can be used to transport control data required for additional profiles on the host. With this it is possible to use the device for audio profiles like Headset Profile (HSP) or Handsfree Profile (HFP). Audio data to be transported over the Bluetooth link will be handled through the Advanced Audio Interface (AAI), without any interaction required from the host.

The LMX9838 audio interface supports PCM master or slave operation. Master operation is used with typical codecs like the OKI, Motorola or Winbond codecs while PCM slave allows the flexible combination with DSPs or other host controllers. See also Section 5.5.

Please check "Texas Instruments: LMX9838 Datasheet" for details on which codecs are supported by LMX9838.

## 2.2 SYSTEM PARAMETERS

The LMX9838 is controlled by system parameters. Since these parameters are stored in an internal EEPROM or non-volatile memory, they are also called "NVS parameters". These parameters define the chip behavior during bluetooth operation but also after a software or hardware reset.

Since the LMX9838 is ROM based, these working parameters are stored in EEPROM and in a dedicated RAM area. These parameters and possible patches are loaded from EEPROM into RAM during boot up.

Table 2 lists the memory map of the System parameters. The address reflects the memory address of the internal EEPROM.

**Table 2. LMX9838 System Parameters, EEPROM Memory Map**

No.	Address	Parameter	Default Value	Description	SW Reset Rrequired
1	0000-0005	BD_Addr	<Unique address>	Bluetooth Device Address.	no
				LAP(lsb), LAP, LAP, UAP, NAP, NAP (msb)	
				Unique address programmed by TI, do not delete.	
2	0006	NVS	0x00	Indicates whether the EEPROM has been initialized or not.	yes
		Initialized		0x00: Initialized	
				0xFF: Not initialized	
3	0007	UnitKeyPresent	0xFF	Used by BT core, generated during pairing procedure.	no

**Table 2. LMX9838 System Parameters, EEPROM Memory Map (continued)**

No.	Address	Parameter	Default Value	Description	SW Reset Required
4	0008-0017	UnitKey	0xFF..0xFF	Used by BT core, generated during pairing procedure.	no
5	0018	DeviceNameLength	0xFF	Length of Parameter 6 "Devicename".	no
6	0019-0040	DeviceName	0xFF...0xFF	Friendly Name of the Bluetooth Device.	no
7	0041	CountryCode	0x00	Used by BT core.	yes
8	0042	PinLength	0x04	The length of parameter 9, "PinCode". In case set to 0, the LMX9838 will request pin from host.	no
9	0043-0052	PinCode	0000	Fixed PinCode used for pairing with other devices.	no
10	0053-0055	ClassOfDevice	0x000000	The "Class of Device" describes general functionality of the Bluetooth Device and is transmitted during the Inquiry process.	no
11	0056	SppPortsToOpen	0x00000001	Bitmask defining the RFCOMM channels to open. For each channel one RFCOMM instance will be created.	no
12	005A	PreferredMasterRole	0x00	Preferred Master forces the device to switch to Master Role after being connected. The device will reject the link if command could not be executed.	yes
13	005B	Automatic Operation	0x01	Configures the general behavior of the device. Please see <a href="#">Section 3.2</a> for details. 0x00: Automatic OFF (Non-automatic) 0x01: Automatic ON (Automatic)	yes
14	005C	PageScanMode	0x01	Configures the connectability of the device. 0x00: not connectable 0x01: normal scan 0x81: interlaced scan (faster connection time)	no
15	005D	InquiryScanMode	0x01	Configures the discoverability of the device. 0x00: not discoverable 0x01: normal scan 0x81: interlaced scan (faster response time)	no
16	005E	SecurityMode	0x02	Configures Service Level Security Mode.	no
17	005F-0060	DefaultLinkPolicy	0x000F	Configures the default link policy for incoming links.	no
18	0061	EventFilter	0x01	Configures the level of events reported to the host. 0x00: No filter, all events reported 0x01: ACL events filtered, only API events reported 0x02: All events filtered, only UART breaks indicated 0x03: All events filtered, including UART break	no
19	0062	PMM / GPIO usage	0xFF	Bitmask to configure enhanced power management (PMM) functions as well as the usage of dedicated GPIO pins. 0x01: enhanced PMM: 1 - disabled (default) 0 - enabled (requires 32 kHz crystal) 0x02: Use PG6 to signal SPP activity (Links) 0x04: Use PG7 to signal TL activity All other bits are reserved and should be set to 1.	yes
20	0063-0064	LinkTimeout	0x7D00	Configures the default link supervision timeout (in slots, 0.625ms) used for incoming and outgoing links.	no

**Table 2. LMX9838 System Parameters, EEPROM Memory Map (continued)**

No.	Address	Parameter	Default Value	Description	SW Reset Rrequired
21	0065	CodecType	0x00	The audio codec settings used on the PCM interface.	yes
				0x00: None connected	
				0x01: Motorola MC145483 / Winbond W681360	
				0x02: OKI MSM7717 / Winbond W681310	
				0x03: PCM slave, see PCMSlaveConfig	
0x04-0xFF: reserved					
22	0066	AirFormat	0x00	The audio format used on the SCO link.	yes
				0x00: CVSD	
				0x01: $\mu$ -Law	
				0x02: A-Law	
0x03-0xFF: reserved					
23	0067-0068	RfcommLatency	0x0000	Configures the default poll period of master to slave.	no
				0x0000: No requirement (default 40slots)	
				0x0002-0x0190: Valid link latency	
24	0069-006C	Frequency	0x00000000	The crystal frequency in Hz. The frequency parameter is only needed when the firmware start up in a mode with unknown crystal frequency (10-20MHz). OP pins are used to determine if the crystal frequency is unknown.	yes
25	006d	UartParityBit	0x00	Parity setting for the hardware UART interface.	yes
				0x00: No Parity	
				0x01: Even Parity	
0x02: Odd Parity					
26	006E	UartStopBit	0x00	Stop bit settings for the hardware UART interface.	yes
				0x00: 1 Stop bit	
				0x01: 2 Stop bits	
27	006F	UartSpeed	0x03	Speed of the Hardware UART interface. This settings are only used, in case the OP pins are configured to Autobaudrate detect.	yes
				2400: 0x00	
				4800: 0x01	
				7200: 0x02	
				9600: 0x03	
				19200: 0x04	
				38400: 0x05	
				57600: 0x06	
				115200: 0x07	
				230400: 0x08	
				460800: 0x09	
921600: 0x0A					
28	0070-00AE	RemoteDevices	0x00..0x00	Default connections database, to be connected during boot-up or by sending a command.	no
29	00AF	VtuneDesiredThreshold	0xFF	TI configured parameter, do not modify.	yes
30	00B0	VtuneCn	0xFF	TI configured parameter, do not modify.	yes
31	00B1	VtuneEnable	0xFF	TI configured parameter, do not modify.	yes

**Table 2. LMX9838 System Parameters, EEPROM Memory Map (continued)**

No.	Address	Parameter	Default Value	Description	SW Reset Rrequired
32	00B2-00B3	PcmSlaveConfig	0xFFFF	This 16-bit value (LSB first) is used to store the PCM format configuration for the PCM slave configuration. This setting is only use in case the PCM slave setting is activated (see No. 21).	yes
				BIT0-1: Slot selection	
				00: use slot 0	
				01: use slot 1	
				10: use slot 2	
				11: use slot 3	
				BIT2-3: Number of slots per frame	
				00: 1 slot	
				01: 2 slots	
				10: 3 slots	
				11: 4 slots	
				BIT4-6: PCM data format	
				000: Reserved	
				001: 8 bit A-Law	
				010: 8 bit $\mu$ -Law	
				011: 13 bit linear	
				100: 14 bit linear	
				101: 15 bit linear	
				110: 16 bit linear	
				111: Reserved	
BIT7: Frame sync length					
0: short frame sync					
1: long frame sync					
BIT8: Data word length					
0: 8-bit data word length					
1: 16-bit data word length					
BIT9: Frame sync polarity					
0: use inverted frame sync					
1: use normal frame sync					
BIT10-15: Unused, set to 0					
33	00B4	PcmFcprs	0xFF	Unsigned integer indicating the frame clock prescaler for generic PCM slave.	yes
34	00B5-00B8	RfSetupReg4	0xFFFF	TI configured parameter, do not modify.	yes
35	00B9-00BC	RfSetupReg15	0xFFFF	TI configured parameter, do not modify.	yes
36	00BD-00EE	Filler 1	0xFF ... 0xFF	Filler (not used).	
37	00EF-011E	ServiceRecords	0xFF..0xFF	SDP/Security info storage.	no
38	011F-0346	CoreNvsLinkKeys	0xFF..0xFF	Link key storage (24 keys).	no
39	0347-0355	AssertInfo	0xFF..0xFF	TI configured parameter, do not modify.	
40	0356-0367	RunErrorInfo	0xFF..0xFF	TI configured parameter, do not modify.	
41	0368-037F	Filler 2	0xFF..0xFF	Filler (not used).	
42	0380-137F	SdpRecords	0xFF..0xFF	SDP record storage.	no
43	1380-1FFF	PatchCode	0xFF..0xFF	ROM patch code storage.	yes