

Evaluates: MAX20353

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MAX20353 Evaluation System

General Description

The MAX20353 evaluation system (EV system) is a fully assembled and tested circuit board that demonstrates the MAX20353 ultra-low-power wearable power-management integrated circuit (PMIC). The MAX20353 includes voltage regulators such as bucks, boost, buck-boost and linear regulators, and a complete battery management solution with battery seal, charger, power path and fuel gauge.

The MAX20353 EV system comes with the MAX20353 board, the MAXPICO2PMB# board, and two micro-B cables. The EV system comes with the MAX20353AEWN+ installed. The MAX20353 is configurable through an I²C interface that allows for programming various functions and reading the device status. The EV system GUI application sends commands to the MAXPICO2PMB# adapter board to configure the device.

Features

- USB Power Option
- Flexible Configuration
- On-Board LED Current Sink and Battery Simulation
- Sense Test Point for Output-Voltage Measurement
- Filter Test Point for Haptic Waveform Measurement
- Windows® 8/10-Compatible GUI Software
- Fully Assembled and Tested

Ordering Information appears at end of data sheet.

EV System Contents

- MAX20353 EV system
- MAXPICO2PMB# board
- Two USB A-to-USB micro-B cables

EV System Contents

FILE	DESCRIPTION
MAX20353EVKitSetupVxxx.exe	PC GUI Program

MAX20353 EV System Board Pic



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Quick Start

Required Equipment

Note: In the following sections, text in **bold** refers to items directly from the EV system software installation.

- MAX20353 EV system
- Windows PC with USB ports
- One USB A-to-USB Micro-B Cable and MAXPI-CO2PMB# adapter board
- One USB A-to-USB Micro-B Cable or Power Supply (for battery simulation or battery voltage)
- (Optional) One USB A-to-USB Micro-B Cable or Power Supply (for charger input CHGIN)
- One voltmeter

Procedure

The EV system is fully assembled and tested. Follow the steps below to verify board operation:

- Visit <u>https://www.maximintegrated.com</u> to download the latest version of the EV system software, MAX20353EVKitSetupVxxx.zip located on the MAX20353 EV system web page. Download the EV system software to a temporary folder and unzip the zip file.
- Install the EV system software on your computer by running the MAX20353EVKitSetupVxxx.exe program inside the temporary folder.
- 3) Verify that all jumpers are in their default positions, as shown in Table 1.

- 4) Connect the type-A end of a cable to the PC and micro-USB end of a cable to the MAXPICO2PMB# board, and connect the MAXPICO2PMB# to J13 located on the lower left of the EV system board.
- 5) Connect a USB A-to-micro-B cable from the computer to J21 on the upper-right corner of the EV system board to use USB VBUS to power the battery simulation circuits on the board, or to power the battery simulation circuits from the VHC test point. (The user can also use a Li-ion battery or power source to evaluate the device if not using the battery simulation circuits. Connect the battery or power source to J2 on the EV system board. Skip step 6 if not using the battery simulation.)
- 6) Use a voltmeter to check that VHC is about 5V and the BATSIM test point is about 3.7V. To adjust the BATSIM voltage, turn the R48 BATSIM potentiometer. Place a shunt on J15, then confirm that TP BAT is equal to the BATSIM voltage.
- On the computer, open the MAX20353 GUI. It should look like <u>Figure 1</u>; the status bar on the bottom displays MAX20353 Not Found.
- Press the PB1 (KIN) button until the device enters ON mode. The GUI then shows Connected and the registers are read and displayed (Figure 2).
- 9) The EV system is now ready for additional evaluation.
- 10) To evaluate the battery charger, the user can shunt J10 and plug in a USB micro-B cable to J1 of the EV system to use the USB VBUS power, or externally supply the charging power on TP CHGIN.

neral Boost Buck 1 Buck 2	LDOs Buck-Boost	Other DC-DC Haptic	Charger	Register Map	Status	
Chip Information (Read Only)		Power Reset Comma	nds			
Hardware ID	01	Soft Reset	Hard Rese	set Power Off		
Firmware ID Bower Configuration Mode	01	Send	Send	Send		
Global Passive Discharge Boot Delay	Enabled 120ms			Dela	y	
ED Configuration		MON Mux and GPIO	Configuratio	on		
LED Current Step	•	O MON Mux Er	nable	MPC	PFN	
LED0 Enable Configuration	LED0 Current	MON Off Mode Con	dition	0	✓ 1 ✓ 2	
LED1 Enable Configuration	LED1 Current	Pulled Low Hi-Z		3 4		
LED2 Enable Configuration	LED2 Current	MON Mux Pin Source	e		*	
¥		MON Resistive Part	ition Ratio		*	

Figure 1. MAX20353 Not Found Status

eneral Boost Buck	1 Buck 2	LDOs	Buck-Boost	Other DC-DC	Haptic	Charger	Register Mar		Statu
Chip Information (Re	ad Only)			Power Reset Commands					
Hardware ID Firmware ID		3		Soft Reset Hard Res		Hard Rese	et Power	Off	
		2		Seno	ł	Send	Send		
Global Passive Discharge			10						
Boot Delay 120ms							De	lay	
Door Delay		12	UIIIS						
LED Configuration				MON Mux and	GPIO	Configurati	on		
LED Current Step		0.6mA	v	MON Mux Enable MPC PF					N
LED0 Enable Confi	guration	LED0 Current					0	~	1
Off	Ŧ			MON Off Mode Condition Pulled Low 			2	2	
LED1 Enable Confi	guration						3	3	
Off	guiudon	1 X Ster		Hi-Z			4		
LED2 Enable Confi	guration	LED2 CI	urrent	MON Mux Pin Source			BAT		v
Off	*	1 X Ste	p v				1:1		¥

Figure 2. MAX20353 Connected Status

Detailed Description of Software

Software Startup

Upon starting the program, the EV system software automatically searches for the USB interface circuit and then for the IC device addresses. The EV system enters normal operating mode when the connection is established and addresses are found. If the USB connection is not detected, the status bar displays **Munich 2 Not Found**. If the USB connection is detected, but the MAX20353 is not found, the status bar shows **MAX20353 Not Found**.

ToolStrip Menu Bar

The ToolStrip menu bar (Figure 3) is located at the top of the GUI window. This bar is comprised of File, Device, **Options**, and **Help** menus whose functions are detailed in the following sections.

File Menu

The **File** menu contains the option to exit out of the GUI program.

Device Menu

The **Device** menu provides the ability to connect or disconnect the EV system to the GUI. The **Advanced** \rightarrow **Use USB2PMB2#** option should be checked if using with the USB2PMB2# adapter board.

Options Menu

The **Options** menu provides several settings to access more features offered by the GUI. The **Disable Polling** option lets the user read the registers manually instead of getting automatically frequent register updates from the IC. The **Disable Fuel Gauge** option allows the user to set the fuel gauge to sleep mode through the I²C and the quiescent current decreases when setting the fuel gauge to sleep mode. The **Disable Automatic Haptic Configuration** option allows the user to disable automatic setting from the GUI. Otherwise, the GUI automatically sets some recommended default configurations to the haptic driver configuration registers as in *Table 199 in the MAX20353 data sheet*.

Help Menu

The **Help** menu contains the **About** option, which displays the GUI splash screen indicative of the GUI version being used.

Tab Controls

Γ

The MAX20353 EV system software GUI provides a convenient way to test the features of the MAX20353. Each tab contains controls relevant to various blocks of the device. Changing these interactive controls triggers a write operation to the MAX20353 to update the register

contents. The **Read All Registers** button reads all the configuration registers that are visible on the current tab page. All statuses are polled continuously. The polling feature can be disabled in the **Options** section of the menu bar by selecting **Disable Polling**.

General Tab

The **General** tab (Figure 4) provides information on device info, set power reset command, enable LEDs, and LED current sink setting, MON setting, PFNs, and MPCs status and configuration.

We	earable Po	wer Manage	ement MAX2035	53 EV Kit			
File	Device	Options	Help				
		19.61			14.00		

Figure 3. The ToolStrip Menu Items

eneral E	Boost	Buck 1	Buck 2	LDOs	Buck-Boost	Other DC-DC	Haptic	Charger	Register Map	 Status 		
Chip Info	ormatio	n (Read	Only)			Power Reset C	ommar	ids				
Hardware ID			3		Soft Reset Hard Res		Hard Rese	et Power Off				
Firmware ID		2		Send	4	Send	Send					
Power	Config	uration I	Mode	01	10							
Global Passive Discharge Enabled							Dela	ay				
BOOT	Delay			12	oms							
LED Cor	nfigurat	ion				MON Mux and	GPIO (Configurati	on			
LED C	urrent	Step		0.6mA	¥	MON Mux Enable MPC				PFN		
LED0	Enable	Configu	ration	LED0 C	urrent				0	✓ 1		
	Of	F	*	1 X Step *		MON Off Mode Condition Pulled Low			2	✓ 2		
LED1	Enable	Configu	iration									
2201	Off	F	-	1 X Ste		Hi-Z			4			
LED2	Enable	Configu	iration	LED2 C	urrent	MON Mux Pin Source			BAT	Ŧ		
	Off	f	w	1 X Ste	p v	MON Resisti	ve Partit	ion Ratio	1:1	v		

Figure 4. General Tab

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Boost Tab

In the Boost tab (Figure 5), the user can enable boost, set boost voltage, and inductor current settings.

eneral Boost Buck 1 Buck 2 LDOs Buck-Boost	Other DC-DC Haptic Charger Register Map 🥥 Status
Boost Enable Enabled Enabled by MPC	Read All Registers
Output Voltage	Inductor Peak Current 425mA Set Adaptive Inductor Peak Current
	 Fast Start FET Scaling

Figure 5. Boost Tab

Buck1/2 Tab

In the **Buck1** and **Buck2** tabs (Figures 6 and 7), the user can enable bucks, set buck voltages, inductor current settings, DVS mode and voltage setting, and some additional settings.

neral Boost Buck 1 Buck 2 LDOs Buck-Boost	Other DC-DC Haptic Charger Register Map 🔾 Status
Buck 1 Enable	
Enabled	
Enabled by MPC	
Disabled	Read All Registers
Output Voltage	Inductor Peak Current
1.00	150mA
Set	Set
Active Discharge Configuration	Adaptive Inductor Peak Current
Passive Discharge Configuration	Fast Start
	FET Scaling
DV3 Voltage	EMI Mode
Alt DVS Voltage v	
	High Efficiency
Controlled by Enable after 100% of boot.	Thigh Etholology

Figure 6. Buck1 Tab

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elleral Buck I Buck Z LDUS Buck-Buust	Other DC-DC Haptic Charger Register Map 🔾 Statu					
Buck 2 Enable						
Enabled						
Enabled by MPC						
Disabled	Read All Registers					
Output Voltage	Inductor Peak Current					
	150mA					
Cat	Cot .					
Sei	Sei					
Active Discharge Configuration	Adaptive Inductor Peak Current					
Passive Discharge Configuration	Fast Start					
DVS Voltage	FET Scaling					
	EMI Mode					
Alt DVS Voltage	Low EMI					

Figure 7. Buck2 Tab

LDOs Tab

The LDOs tab (Figure 8) lets the user enable LDOs, set LDO voltages, and change to load switch mode.

ile Device Options Help							
eneral Boost Buck 1 Buck 2 LDOs Buck-Boost	Other DC-DC Haptic Charger Register Map OStatus						
LDO 1 Enable	LDO 2 Enable						
Enabled	Enabled						
Enabled by MPC	Enabled by MPC						
 Disabled 	Disabled Read All Registers						
Output Voltage	Output Voltage						
1.2V	3.2V						
Set	Set						
Active Discharge Configuration	Active Discharge Configuration						
Passive Discharge Configuration	Passive Discharge Configuration						
Load Switch Mode	Load Switch Mode						
Controlled by Enable after 100% of boot.	Controlled by Enable after 100% of boot.						

Figure 8. LDOs Tab

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Buck Boost Tab

In the **Buck Boost** tab (Figure 9), the user can enable buck boost, set buck boost voltage, and inductor current settings.

ile Device	Options H	lelp								
eneral B	oost Buck 1	Buck 2	LDOs	Buck-Boost	Other DC-	DC H	laptic	Charger	Register Map	Status
Buck-Bo	ost Enable									
Enab	led									
 Enab Disat 	led by MPC	Ŧ							Read All Re	gisters
					C					
Outp	ut Voltage				Indu	ictor P	eak C	urrent		
_			-0	5V	_)		100n	A
		Sot				1		Set		
		Oel						Uer		
\bigcirc	Active Discha	arge Cont	figuratior	ı	0	Curr	ent Lir	nited Outp	out Mode	
	Passive Disc Ripple Reduc	harge Co	nfiguratio	on	Clo	k Divi	der Se	tting (0-12	27) 0	Set
					EMI	Mode		Ir	nductance Sele	ect
						Low EN	/I fficions		4.7µH	
Cont	rolled by Enab	le after 10	00% of b	oot.		iiyn E	ncienc	y	5.5µ1	

Figure 9. Buck Boost Tab

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Other DC-DC Tab

The **Other DC-DC** tab (Figure 10) includes the Charge Pump and SFOUT settings.

eneral Boost Buck 1 Buck 2 LDOs Buck-Boos	t Other DC-DC Haptic Charger Register Map	Status
	· · · · · · · · · · · · · · · · · · ·	• • • • • •
Charge Pump Enable	SFOUT Enable	
Enabled	Enabled	
Enabled by MPC	Enabled by MPC	istore
Disabled	Disabled	ISLEIS
Output Voltage	Output Voltage	
5V	5V	
O C CV	0 2 21/	
0.00	• 3.3 V	
Set	Set	
Bassiva Disabarga Configuration		
Passive Discharge Configuration		
Controlled by Enable after 100% of boot.		

Figure 10. Other DC-DC Tab

Haptic Tab

The **Haptic** tab (Figure 11) lets the user choose the actuator type, haptic driver mode, and different settings for each mode.

General	Boost Buc	k 1 Buck 2	LDOs	Buck-Boost	Other DC-DC	Haptic	Charger	Registe	r Map	Status
Haptic R4	C Pattern Mod	le tern - MPC	¥		Haptic Mode	e Select de		VFS	3.00	V v
Ex	ternal Triggere	ed - MPC	¥			Je		Read	All Regi	sters
Di	sabled							A	dvanced.	
RAM	Haptic Patter	m Mode			Real-Time I	2C				
RAN	RAM Address 0x00 -					Amplitude -0.00% of VFS +				
Last	Sample	Not La	st Sample	¥						
Amp	olitude	-25.20	% of VFS	¥	External Tri					
Dura	ation	2	5 <mark>ms</mark>	Ŧ	Amplitude Durat					ı
Wait	Ē	7	5 <mark>ms</mark>	Ŧ	Overdrive	-100.0	0% of VFS	¥	20ms	¥
Rep	eat	Repea	t 5 Times	¥	Active	-59.84	4% of VFS	¥	500ms	¥
		0.00	141.2	Datte	Braking	+100.0	0% of VES		20mg	

Figure 11. Haptic Tab

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Charger Tab

The **Charger** tab (Figure 12) lets the user set charger and thermistor monitor configurations. The charger and thermistor status section constantly polls the charger and thermistor status and displays any changes. The polling happens even when the **Charger** tab is not selected. The polling can be disabled by selecting **Disable Polling** in the **Options** menu at the top of the application.

eneral	Boo	ost Buck	1 Buck 2	LDOs	Buck-Boost	Other DC-DC	Haptic	Charger	Register Map	Statu:
Charg	er able sable	d ed				Thermal Mo Enabled Disabled	onitor 1			
									Read All Re	gisters
Therr	nal I	Regulation	1			Charger Sta	atus		hermistor State	us
Zor	ne	Charger Enabled	BatReg	F	Chg	Charger	off		Detection dis CHGIN not pr	abled, esent.
Co	ld	\bigcirc	-150mV *	0.2 x	IFChg 🔻	Thermal Li	mits			
Co	ol	\bigcirc	-150mV 🔹	0.2 x	IFChg 👻	Cold Lin	nit		1.398V	•
Ro	om		BatReg *	1.0 x	IFChg 👻	Cool Lin	nit		1.398V	Ŧ
Wa	arm	\bigcirc	-150mV *	0.2 x	IFChg 👻	Warm Li	imit		0.529V	*
Ho	t	\bigcirc	-150mV 👻	0.2 x	IFChg 🔻	Hot Limi	t		0.529V	w

Figure 12. Charger Tab

Register Map Tab

The **Register Map** tab allows for the configuration of all I²C registers and AP Commands, including those not configurable in other tabs. In the top right corner of the tab page, the user can select between direct I²C registers and AP commands.

For direct I^2C (Figure 13), the register to be read from or written to can be selected in the left table. The right table contains descriptions for each register field of the select-

ed 8-bit register. All bits, along with their field names, are displayed at the bottom of the page.

To set a bit, click the bit label. **Bold** text represents logic 1 and regular text represents logic 0. To configure the changes to the device, click the **Write** button at the bottom right.

The user can click **Read All** to perform a burst read of all registers.

Beneral	Boost	Buck 1 E	Buck 2 LDOs	Buck-Bo	post	Other DC-DC	Haptic Cha	rger Regist	ter Map	Status
Rea	d All								Direct I2C	-
Addr		Regis	ter	Value	^	Field	N	ame	Desc	ription
0x00	HW ID			0x03		0000000	22221		Indicates	the
0x01	FW ID			0x02		Bit [7:0]	HWID		current ha	ardware
0x03	INT0			0x00					TOTOTOTI.	
0x04	INT1			0x00						
0x05	INT2			0x80						
0x06	Status0			0x38						
0x07	Status1			0x20						
0x08	Status2			0x00						
0x09	Status3			0x00						
0x0B	SystemE	Frror		0x00						
Ovoc	IntMask	1		0,00	¥					
	7	6	5	4		3	2	1		0
12.2.2	וקו	HW IDI61	HW ID[5]	HW ID	141	HW ID[3]	HW ID[2]	HW ID[1]	HW	IDIOI

Figure 13. Register Map Tab Direct I²C

For AP commands (Figure 14), the left table is populated with all AP commands in the order of their operation codes. When an AP command is selected, its APDataOut/ In registers expand under it. Selecting an APData register shows the individual bit descriptions and allows the user to read/write individual bits just like the direct I²C option. After writing or before reading the APData registers, the user can send the operation code for the selected AP command by clicking the **Send Opcode** button at the bottom right of the tab page.

A common action when sending AP commands manually is to send a read opcode, modify one specific setting (like VSet or BstEn), then send the corresponding write opcode. To speed up this read/modify/write action, the **APDataIn** to **APDataOut** button in the top left of the tab page can copy all APDataIn registers to the APDataOut registers.

Beneral	Boost	Buck 1	Buck 2	LDOs	Buck-Boost	Other DC-DC H	laptic Charger	Regis	ter Map	 Sta 	tus
APData	ain to APD	ataOut						AF	Comma	inds	
Opcode			Comman	d	^	Field	Name		Desc	ription	^
0x01	APDataC APDataC APDataC	onfig_Write OutO Out1 Out2	•			APDataOut0 [4:0]	APDataOut0		Contain GPIO0C GPIO0C GPIO0F GPIO0F GPIO0F	s: Cmd, Od, HizB, Res, Pup.	
0x02 0x03	APDataC APDataC GPIO_C GPIO_C	out3 Out4 onfig_Rea ontrol_Writ	d			APDataOut1 [4:0]	APDataOut1		Contain GPI010 GPI010 GPI01H GPI01R CPI01R	s: cmd, d, lizB, tes,	
0x04 0x06 0x07	GPIO_CO	ontrol_Rea	ad 1						Contain GPIO20 GPIO20	s: md, d,	-
7	,	6		5	4	3	2	1		0	
-		-			-	-	-	-		-	

Figure 14. Register Map Tab AP Commands

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Status Tab

The **Status** tab (Figure 15) shows the user the state of the interrupt registers, INT0–INT2, and the status registers, Status0–Status3. The **Read Interrupts** button reads all

INT and STATUS registers and updates the text color to teal to indicate a 1 was read. Interrupt polling can be disabled by selecting **Disable Polling** in the **Options** menu at the top of the application.

General Boost Buck	1 Buck 2 LDOs	Buck 2 LDOs Buck-Boost		Haptic Charg	ger Register Map 🔵 Statu	
Int0	Int1		Int2			
ThmStatInt ChgStatInt ILimInt UsbOVPInt UsbOkInt ChgThmSDInt ThmRegInt ChgTmoInt	ThmSD BstFltln ThmBu UVLOLI UVLOLI ThmLD ThmLD	ThmSDInt BstFltint ThmBuck2Int ThmBuck1Int UVLOLDO2Int UVLOLDO1Int ThmLDO2Int ThmLDO1Int Status1		Respint t dnt nint imint imint	 Interrupt Detected Read Interrupts Note: Interrupts clear on read. Interrupts can be masked by modifying the IntMask registers (000C-000E) 	
Status0	Status1				Status3	
- ThmStat[2] ThmStat[1] ThmStat[0] ChgStat[2] ChgStat[1] ChgStat[0]	- ILim UsbOVI UsbOk ChgJEI ChgJEI ChgJEI	- - UsbOVP UsbOk ChgJEITASD ChgJEITAReg ChgTmo		k2 k1 02 01 02 01	APCmdResp SysErr - LRALock LRAAct BBstThm SysBatLim ChgSysLim	

Figure 15. Status Tab

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Detailed Description of Hardware

The MAX20353 EV system evaluates the MAX20353 ultra-low-power wearable PMIC, which communicates over the I²C interface. The EV system demonstrates the IC features such as boost, bucks, linear regulators, buck-boost, LED current sink, battery charger, and haptic

driver. The EV system uses the IC in a 56-bump waferlevel package on a proven, four-layer PCB design. The EV system can use USB VBUS +5V DC for battery and charger input-power source. Alternatively, the EV system can be powered from an external power supply. Figure 16 shows the EV system block annotated pictures (see the *MAX20353 EV System Board Pic*).



Figure 16. MAX20353 EVSYSKIT Block Annotated Picture

Hardware Setup

To use the EV system with the GUI, connect the MAXPICO2PMB2# to the PMOD connector in the bottom left corner of the board. The MAXPICO2PMB2# also provides 3.3V to the logic voltage VIO of the EV system when shunting J20. The user can use J21 USB VBUS to power the battery simulation circuits on the EV system to supply BAT of the IC. Turning the R48 potentiometer can change the BATSIM voltage. Connect BATSIM to BAT of the IC with a shunt on J15. Alternatively, instead of using battery simulation circuits on the board, the user can connect their Li-ion battery on the J2 connector. The user can use the J1 USB VBUS as the CHGIN source and place a shunt on J10.

PFNs and MPCs States

The PFNs and MPCs can be pulled up to VIO through a 100k Ω resistor, or connected to ground through a 100k Ω resistor.

Regulators and Peripherals

All regulator outputs are made available on test points. The inputs to the LDO1, and LDO2 must be supplied externally through test points. Bucks, buck-boost, boost, and charge pump outputs have sense test points which provide easy voltage measuring.

Thermistor and SET Adjustment

When the J4 shunt is installed, THM is pulled up to TPU through a $10k\Omega$ resistor. Header J5 is used to select the pull-down resistor for THM. When pin 1 and 2 is shunted, potentiometer R31 is used to simulate a thermistor at THM. When pin 2 and 3 is shunted, a fixed $10k\Omega$ resistor is connected between THM and ground.

Header J19 is used to select the resistor for R_{ISET}, which sets the fast charge current (I_{FCHG}). Shunting pin 1 and 2 selects potentiometer R33 and the user can change R_{ISET} to change I_{FCHG}. Shunting pin 2 and 3 selects a fixed 39k Ω resistor, which sets the fast charge current to 51mA.

INT and **RST** LED Indicators

Shunts can be installed on J11 and J12 to show the status of $\overline{\text{INT}}$ and $\overline{\text{RST}}$ as LED indicators, DS2 and DS3. When the corresponding LED luminates, it means the active-low output is pulled low.

Haptic Driver

The haptic driver output is on J3 where an LRA or ERM vibration motor can be connected. By shunting J24 and J25, the user can measure the haptic waveform with the on-board low-pass filters, which convert PWM to a sine wave.

LED Current Sink

The EV system includes multiple LEDs to test the LED0, LED1, and LED2 current sinks. The current source for LED1 and LED2 can be connected to SYS by shunting J14. The current source for LED0 can be selected between SYS and BSTOUT by J23. Using J24, the user can select between sinking the current from one LED or three LEDs for LED0.

Jumper Setting

<u>Table 1</u> shows the detailed jumper setting, and <u>Table 2</u> shows the connector description.

Fuel Gauge Software

The MAX20353 integrates the MAX17048, a fuel gauge IC which implements the Maxim ModelGauge ™ algorithm. Use the MAX20353 Fuel Gauge GUI and MAXPICO2PMB to evaluate the ModelGauge ™ fuel gauge.

Software Installation

Visit <u>https://www.maximintegrated.com</u> to download the latest version of the Fuel Gauge EV kit software, MAX20353FuelGaugeSetupVxxx.zip located on the MAX20353 EV Kit web page. Download the software to a temporary folder and unzip the zip file. Install the Fuel Gauge EV kit software on your computer by running the MAX20353FuelGaugeSetupVxxx.exe program inside the temporary folder.

Hardware Setup

The following procedure applies to the MAX20353 EVKIT:

- Connect the MAXPICO2PMB Adapter Board to J13 of the MAX20353 EVKIT.
- 2) Connect jumper J10 and remove jumper J15.
- 3) Connect the application's battery to jumper J2 and ensure the battery's polarity connection.
- 4) Connect the MAXPICO2PMB Adapter Board to the computer USB port via USB A to USB Micro-B cable.

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Table 1. Jumper Setting

JUMPER	SHUNT POSITION	DESCRIPTION
J4	1–2*	Connect THM to TPU for thermistor monitoring
15	1–2	Connect THM to a potentiometer
	2–3*	Connect THM to 10kΩ (50%/room zone)
	1–2	Pull down MPC3 to ground
J6	1–3	Connect MPC3 connect to GPIO4
	1–4	Pull up MPC3 to VIO
	1–2	Pull down MPC2 to ground
J7	1–3	Connect MPC2 to GPIO3
	1–4	Pull up MPC2 to VIO
	1–2	Pull down MPC1 to ground
J8	1–3	Connect MPC1 to GPIO2
	1–4	Pull up MPC1 to VIO
	1–2	Pull down MPC0 to ground
J9	1–3	Connect MPC0 to GPIO1
	1–4	Pull up MPC0 to VIO
J10	1–2	Connect CHGIN to USB VBUS from J1
J11	1–2*	Connect INT to pull up VIO and DS2
J12	1–2*	Connect RST to pull up VIO and DS3
J14	1–2	Supply LED1/LED2 from SYS voltage
J15	1–2	Connect BATSIM to BAT
14.6	1–2	Pull up MPC4 to VIO
J 10	2–3	Pull down MPC4 to ground
117	1–2	Pull up PFN2 to VIO
JIT	2–3	Pull down PFN2 to ground
110	1–2	Pull up PFN1 to VIO
J10	2–3	Pull down PFN1 to ground
110	1–2	Connect SET to potentiometer
319	2–3*	Connect SET to $39k\Omega$ (fast charge current 0.05A)
J20	1–2*	Connect VIO to 3.3V from PMOD
J22	1–2*	Connect VHC to USB VBUS from J21
100	1–2	Supply LED0 from SYS
J23	2–3	Supply LED0 from BSTOUT
J24	1–2	Connect DRP to a low-pass filter, which converts PWM to a sine wave. The measures are a filtered waveform at DRP_F.
J25	1–2	Connect DRN to a low-pass filter, which converts PWM to a sine wave. The measures are a filtered waveform at DRN_F.
126	1–2	Connect LED0 to one LED
J20	2–3	Connect LED0 to three LEDs
130	1–2	Connect SDA to ground
128	2–3	Connect SCL to ground

*Default position.

Table 2. Connectors Description

CONNECTOR	DESCRIPTION
J1	Connect to the USB cable for CHGIN voltage
J2	Connect to Battery
J3	Connect to the LRA/ERM haptic actuator
J13	Connect to MAXPICO2PMB2#
J21	Connect to the USB cable for battery simulation

Communication Port

The Fuel Gauge software automatically finds the MAXPICO2PMB adapter when connected to any USB port. Communication status is shown on the left-hand side of the bottom status bar. See Figure 17. If communication is valid, a green bar updates as the software continuously reads the IC registers.

Main Window

Most major functionality is available from the main window. (see Figure 18).

	Reading	✓ Periodically Read Regsters
--	---------	------------------------------

Figure 17. Bottom Status Bar

R	maxi	m	od	R SOC 8 VCell 5 CRate 8	Always Hibernat Never Hibernate	e
	integ	rate	ea™	12.586 %	Default Hibernat	e
					Clear Alert Pin	
Load Custom Mo	del V	erify				
Start Data Loo	Sto	p Log				
20 - °C> RCC	MP Øx2D		Write RCOMP		Disconnect Adapt	er
]	Tinte Reolim		Disconnect Adapt	
			MAX17048/	MAX17049 is using the custom model "Dexcom_2807"		
Registers I ² C Com	munication Log	Chart	Documentat	tion		
Registers I ² C Com Register Name	munication Log Command	Chart Value	Documentat Meaning	tion Description		^
Registers I ² C Com Register Name VCell	munication Log Command 0x02	Chart Value 0xB940	Documental Meaning 3.705 V/cell	tion Description Battery Voltage per cell		^
Registers I ² C Comm Register Name VCell SOC	munication Log Command 0x02 0x04	Chart Value 0xB940 0x0C96	Documentat Meaning 3.705 V/cell 12.586 %	tion Description Battery Voltage per cell State of Charge is the percent of battery capacity remaining.		^
Registers ² C Comi Register Name VCell SOC CRate	munication Log Command 0x02 0x04 0x16	Chart Value 0xB940 0x0C96 0xFF91	Documentar Meaning 3.705 V/cell 12.586 % -0.231 C	tion Description Battery Voltage per cell State of Charge is the percent of battery capacity remaining. Approximate charge/discharge rate of the battery (1C == 100%/Hr). Do not tr Ampere!	ranslate to	^
Register I ² C Com Register Name VCell SOC CRate MODE	munication Log Command 0x02 0x04 0x16 0x06	Chart Value 0xB940 0x0C96 0xFF91 0x0000	Documentar Meaning 3.705 V/cell 12.586 % -0.231 C	tion Description Battery Voltage per cell State of Charge is the percent of battery capacity remaining. Approximate charge/discharge rate of the battery (1C == 100%/Hr). Do not tr Ampere!	ranslate to	^
Registers I ² C Comm Register Name VCell SOC CRate MODE MODE.HibStat	Command 0x02 0x04 0x16 0x06 0x06[12]	Chart Value 0xB940 0x0C96 0xFF91 0x0000 0	Documental Meaning 3.705 V/cell 12.586 % -0.231 C	tion Description Battery Voltage per cell State of Charge is the percent of battery capacity remaining. Approximate charge/discharge rate of the battery (1C == 100%/Hr). Do not tr Ampere! This bit is set when the IC is in low-power hibernate mode. During this mode period reduces to 45s. Fuel-gauging remains accurate if battery voltage char slowly.	anslate to e, the sampling nges sufficiently	^
Registers I ² C Com Register Name VCell SOC CRate MODE MODE.HibStat	Command 0x02 0x04 0x16 0x06 0x06[12] 0x06[13]	Chart Value 0xB940 0x0C96 0xFF91 0x0000 0	Documental Meaning 3.705 V/cell 12.586 % -0.231 C	tion Description Battery Voltage per cell State of Charge is the percent of battery capacity remaining. Approximate charge/discharge rate of the battery (1C == 100%/Hr). Do not tr Ampere! This bit is set when the IC is in low-power hibernate mode. During this mode period reduces to 45s. Fuel-gauging remains accurate if battery voltage char slowly. If the host sets this bit, the IC is permitted to sleep if SDA and SCL are held lo writes CONFIG.SLEEP to 1.	anslate to , the sampling nges sufficiently w, or the host	^
Registers ² C Comr Register Name VCell SOC CRate MODE MODE.HibStat MODE.EnSleep Version	Command 0x02 0x04 0x16 0x06 0x06[12] 0x06[13] 0x08	Chart Value 0xB940 0x0C96 0xFF91 0x0000 0 0	Documental Meaning 3.705 V/cell 12.586 % -0.231 C	tion Description Battery Voltage per cell State of Charge is the percent of battery capacity remaining. Approximate charge/discharge rate of the battery (1C == 100%/Hr). Do not tr Ampere! This bit is set when the IC is in low-power hibernate mode. During this mode period reduces to 45s. Fuel-gauging remains accurate if battery voltage char slowly. If the host sets this bit, the IC is permitted to sleep if SDA and SCL are held lo writes CONFIG.SLEEP to 1. Identifies the revision of silicon	anslate to the sampling nges sufficiently w, or the host	^
Registers PC Comm Register Name VCell SOC CRate MODE MODE.HibStat MODE.EnSleep Version HIBRT	Command 0x02 0x04 0x16 0x06[12] 0x06[13] 0x08 0x08	Chart Value 0xB940 0x0C96 0xFF91 0x0000 0 0 0 0 0x0012 0x8030	Documental Meaning 3.705 V/cell 12.586 % -0.231 C	tion Description Battery Voltage per cell State of Charge is the percent of battery capacity remaining. Approximate charge/discharge rate of the battery (1C == 100%/Hr). Do not tr Ampere! This bit is set when the IC is in low-power hibernate mode. During this mode period reduces to 45s. Fuel-gauging remains accurate if battery voltage char slowly. If the host sets this bit, the IC is permitted to sleep if SDA and SCL are held lo writes CONFIG.SLEEP to 1. Identifies the revision of silicon	anslate to the sampling nges sufficiently w, or the host	
Registers I ² C Comm Register Name VCell SOC CRate MODE MODE.HibStat MODE.EnSleep Version HIBRT HIBRT.HibrtThr	Command 0x02 0x04 0x16 0x06[12] 0x06[13] 0x08 0x04	Chart Value 0xB940 0xFF91 0x0000 0 0 0x0012 0x8030 0x30	Documental Meaning 3.705 V/cell 12.586 % -0.231 C	tion Description Battery Voltage per cell State of Charge is the percent of battery capacity remaining. Approximate charge/discharge rate of the battery (1C == 100%/Hr). Do not tr Ampere! This bit is set when the IC is in low-power hibernate mode. During this mode period reduces to 45s. Fuel-gauging remains accurate if battery voltage char slowly. If the host sets this bit, the IC is permitted to sleep if SDA and SCL are held lo writes CONFIG.SLEEP to 1. Identifies the revision of silicon Hibernate Threshold. Set HibrtThr and ActThr to 0x00 to disable hibernate, o hibernate always	ranslate to e, the sampling nges sufficiently ow, or the host or both to 0xFF to	^

Figure 18. Main Window

Loaded Custom Model

This group displays any custom model that has been loaded onto the part by the software. If the device resets, this model is automatically reloaded. If you are using the default model, nothing is displayed here. Any changes to the configuration file are not reloaded automatically.

Start Data Log

This group displays the file path to which the software is recording the registers. If this box is blank, no file is being saved.

RCOMP Configuration

You can enter a byte here and press the **Write RCOMP** button to write it to the device. This is not the same as writing the value into the register map, because RCOMP is part of a larger 2-byte register.

If you have a custom model, you can also change the temperature, which adjusts the fuel gauge for proper temperature performance. Changing this value immediately calculates a new value of RCOMP and displays it in the box. This value is not written to the device until you press the **Write RCOMP** button. A change to RCOMP is not reflected in the temperature.

Registers Tab

Notation used for name and address should be familiar to C programmers with one small change. The register map lists:

- Register Name: A dot indicates that a single address has multiple meanings. This is similar to how the C firmware might access the bits.
- Command/Address: A colon indicates the 0-indexed location, not the size of the bit field. A colon indicates a range of values (e.g., 0x0C[0:4] is a 5-bit value, offset 0 bits at address 0x0C).
- Value: The raw hex value as read directly from the device.

Ordering Information

PART	TYPE
MAX20353EVSYS#	EVKIT

#Denotes RoHS compliant.

Evaluates: MAX20353

- Meaning: A conversion of the raw hex value, usually with units. Alert bit flags are blank when inactive, or show text when they are alerting.
- Description: Reminders of the functionality. For full details, refer to the MAX17048/MAX17049 IC data sheet. The user can write values to the device directly through the register map. To write a raw hex value, select the cell in the Value column, overwrite the value, and press the Enter or Tab key. You will be prompted to write to the device. Normal communication will pause, and you will see a corresponding blank spot in the graph.

For registers with a conversion factor (e.g., Hibernate Threshold or VAlertMax, you can also modify the Meaning column. The software converts the value back to the raw hex value, and prompts to verify that you are writing what you expect. Remember that not all registers are writable.

I²C Communication Log Tab

Here you can see a log of traffic that you initiate, as well as any time the device is programmed. It describes each step in detail, including the particular values read or written. This can help remove uncertainty about how to communicate with the device. This log does not show the standard reading events.

Chart Tab

The chart is interactive: You can zoom into the time axis by left-clicking and dragging anywhere in the plot area. You will see the region highlighted as you drag. You can zoom out either by clicking the small button in the bottom left, or by right-clicking in the plot area. Plotted information not in a log file cannot be recovered once the application closes. The top and bottom plots are synchronized in time, so zooming one zooms the other. The y axes are fixed scale, and you cannot modify which registers are plotted, or where.

Evaluates: MAX20353

MAX20353 EV System Bill of Materials

ITEM	REF_DES	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
1	BATSIM, TP1-TP14	15	5003	KEYSTONE	N/A	TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; ORANGE; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
2	BBOUT_S, BK1OUT_S, BK2OUT_S, BSTOUT_S, CPOUT_S, DRN_F, DRP_F	7	5002	KEYSTONE	N/A	TEST POINT; PIN DIA=0.11N; TOTAL LENGTH=0.31N; BOARD HOLE=0.04IN; WHITE; PHOSPHOR BRONZE WIRE SILVER;
3	C1, C2, C5, C10, C11	5	C1005X5R1V225M050BC	TDK	2.2UF	CAP; SMT (0402); 2.2UF; 20%; 35V; X5R; CERAMIC
4	C3, C4, C6, C8, C15	5	C1005X5R0J475K050BC	TDK	4.7UF	CAP; SMT (0402); 4.7UF; 10%; 6.3V; X5R; CERAMIC
5	C7	1	C0402C273K4RAC	KEMET	0.027UF	CAP; SMT (0402); 0.027UF; 10%; 16V; X7R; CERAMIC
6	C9, C13, C14, C16, C18, C19	6	GRM188R60J226ME15	MURATA	22UF	CAP; SMT (0603); 22UF; 20%; 6.3V; X5R; CERAMIC
7	C12, C20	2	C1608X5R1E106M080AC; CL10A106MA8NRNC; GRM188R61E106MA73; ZRB18AR61E106ME01; GRT188R61E106ME13	TDK;SAMSUNG ELECTRONICS;MURATA;MURATA ;MURATA	10UF	CAP; SMT (0603); 10UF; 20%; 25V; X5R; CERAMIC
8	C17	1	GRM155R71A104KA01; C1005X7R1A104K050BB; C0402C104K8RAC	MURATA;TDK;KEMET	0.1UF	CAP; SMT (0402); 0.1UF; 10%; 10V; X7R; CERAMIC
9	C21-C26	6	C1005X7R1C104K050BC; ATC530L104K116; 0402YC104KA12A; C0402X7R160-104KKE; CL05B104K05NNNC; GRM155R71C104KA88; C1005X7R1C104K; CC0402KRX7R7BB104; EMK105B7104KV; CL05B104KO5	TDK:AMERICAN TECHNICAL CERAMICS:AVK;VENKEL LTD:SAMSUNG ELECTRONICS:MURATA;TDK;YAG EO PHICOMP:TAIYO YUDEN;SAMSUNG ELECTRONICS	0.1UF	CAP; SMT (0402); 0.1UF; 10%; 16V; X7R; CERAMIC
10	C27, C30	2	GRM31CR71H475KA12; GRJ31CR71H475KE11; GXM31CR71H475KA10; UMK316AB7475KL	MURATA;MURATA;MURATA;TAIY O YUDEN	4.7UF	CAP; SMT (1206); 4.7UF; 10%; 50V; X7R; CERAMIC
11	C28	1	C0603C225K9PAC; GRM188R60J225KE01; C1608X5R0J225K080AB	KEMET;MURATA;TDK	2.2UF	CAP; SMT (0603); 2.2UF; 10%; 6.3V; X5R; CERAMIC;
12	C29	1	C0402X7R500-222KNE; GRM155R71H222KA01; C1005X7R1H222K050BA	VENKEL LTD.;MURATA;TDK	2200PF	CAP; SMT (0402); 2200PF; 10%; 50V; X7R; CERAMIC
13	C31	1	C3216X5R1C476M160AB; GRM31CR61C476ME44	TDK;MURATA	47UF	CAP; SMT (1206); 47UF; 20%; 16V; X5R; CERAMIC
14	C32	1	C3216X5R1H106K160AB; GRM31CR61H106KA12	TDK;MURATA	10UF	CAP; SMT (1206); 10UF; 10%; 50V; X5R; CERAMIC
15	C33	1	C1608X5R1H104K080AA	TDK	0.1UF	CAP; SMT (0603); 0.1UF; 10%; 50V; X5R; CERAMIC
16	C34	1	GRM188R60J105KA01	MURATA	1UF	CAP; SMT (0603); 1UF; 10%; 6.3V; X5R; CERAMIC;
17	C35	1	C0603C475K9PAC	KEMET	4.7UF	CAP; SMT (0603); 4.7UF; 10%; 6.3V; X5R; CERAMIC;
18	C36	1	C0603C104K8RAC	KEMET	0.1UF	CAP; SMT (0603); 0.1UF; 10%; 10V; X7R; CERAMIC
19	DS1-DS3, DS10	4	LG L29K-G2J1-24	OSRAM	LG L29K-G2J1-24	DIODE; LED; SMT (0603); Vf=1.7V; If(test)=0.002A; -40 DEGC TO +100 DEGC
20	DS4, DS8, DS9	3	LTST-C171TBKT	LITE-ON ELECTRONICS INC.	LTST-C171TBKT	DIODE; LED; SMD LED; BLUE; SMT (0805); PIV=5V; IF=0.020A
21	DS5-DS7	3	LTST-C150KRKT	LITE-ON ELECTRONICS INC.	LTST-C150KRKT	DIODE; LED; STANDARD; RED; SMT (1206); PIV=2V; IF=0.02A; -30 DEGC TO +85 DEGC
22	J1, J21	2	ZX62D-B-5P8	HIROSE ELECTRIC CO LTD.	ZX62D-B-5P8	CONNECTOR; MALE; SMT; MICRO UNIVERSAL SERIES BUS B-TYPE CONNECTOR; RIGHT ANGLE; 5PINS
23	J2, J3	2	800-10-002-10-001000	MILLMAX	800-10-002-10-001000	CONNECTOR; MALE; TH; SINGLE ROW; STRAIGHT; 2PINS
24	J4, J10-J12, J14, J15, J20, J22, J24, J25	10	PBC02SAAN	SULLINS ELECTRONICS CORP.	PBC02SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 2PINS
25	J5, J16-J19, J23, J26, J39	8	PBC03SAAN	SULLINS	PBC03SAAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; STRAIGHT; 3PINS; -65 DEGC TO +125 DEGC
26	J6-J9	4	TSW-104-07-L-S	SAMTEC	TSW-104-07-L-S	EVKIT PART-CONNECTOR; MALE; THROUGH HOLE; TSW SERIES; SINGLE ROW; STRAIGHT; 4PINS
27	J13	1	PBC06DBAN	SULLINS ELECTRONICS CORP.	PBC06DBAN	CONNECTOR; MALE; THROUGH HOLE; BREAKAWAY; RIGHT ANGLE; 12PINS; 12PINS - ALTERNATE PIN NUMBERING
28	L1, L4	2	DFE201610E-4R7M=P2	MURATA	4.7UH	INDUCTOR; SMT (2016); METAL ALLOY CHIP; 4.7UH; TOL=+/-20%; 1.3A
29	L2, L3	2	DFE201612E-2R2M	MURATA	2.2UH	INDUCTOR; SMT (0806); WIREWOUND CHIP; 2.2UH; TOL=+/-20%; 1.8A
30	PB1	1	1825910-6	TE CONNECTIVITY	1825910-6	SWITCH; SPST; THROUGH HOLE; 24V; 0.05A; TACTILE SWITCH; RCOIL=0 OHM; RINSULATION=100M OHM; TE CONNECTIVITY

Evaluates: MAX20353

MAX20353 EV System Bill of Materials (continued)

ITEM	REF_DES	QTY	MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
31	R1, R2, R19, R20, R23, R44, R49	7	CRCW040210K0FK; RC0402FR-0710KL	VISHAY DALE;YAGEO PHICOMP	10K	RES; SMT (0402); 10K; 1%; +/-100PPM/DEGC; 0.0630W
32	R3	1	ERJ-2RKF3902X; CRCW040239K0FK	PANASONIC;VISHAY DALE	39K	RES; SMT (0402); 39K; 1%; +/-100PPM/DEGC; 0.0630W
33	R4, R6, R7, R9, R10, R12, R13, R15, R40-R43, R47, R60-R65	19	ERJ-2GEJ104	PANASONIC	100K	RES; SMT (0402); 100K; 5%; +/-200PPM/DEGC; 0.1000W
34	R5, R8, R11, R14	4	ERJ-2RKF1001	PANASONIC	1K	RES; SMT (0402); 1K; 1%; +/-100PPM/DEGC; 0.1000W
35	R16-R18, R21	4	CRCW0402499RFK	VISHAY DALE	499	RES; SMT (0402); 499; 1%; +/-100PPM/DEGC; 0.0630W
36	R22, R36, R37	3	CRCW040210R0JNEDHP	VISHAY DRALORIC	10	RES; SMT (0402); 10; 5%; +/-200PPM/DEGK; 0.2000W
37	R25-R30	6	ERJ-2RKF3000	PANASONIC	300	RES; SMT (0402); 300; 1%; +/-100PPM/DEGC; 0.1000W
38	R31, R32	2	PV36Y105C01B00	MURATA	1M	RESISTOR; THROUGH-HOLE-RADIAL LEAD; PV36 SERIES; 1M OHM; 10%; 100PPM; 0.5W; TRIMMER POTENTIOMETER; 25 TURNS; MOLDER CERAMIC OVER METAL FILM
39	R33	1	CRCW04023K40FK	VISHAY DALE	3.4K	RES; SMT (0402); 3.4K; 1%; +/-100PPM/DEGC; 0.0630W
40	R45, R46	2	WSL0805R1000FEA18	VISHAY DALE	0.1	RES; SMT (0805); 0.1; 1%; +/-75PPM/DEGC; 0.1250W
41	R48	1	3296Y-1-253LF	BOURNS	25K	RESISTOR; THROUGH-HOLE-RADIAL LEAD; 3296 SERIES; 25K OHM; 10%; 100PPM; 0.5W; SQUARE TRIMMING POTENTIOMETER; 25 TURNS; MOLDER CERAMIC OVER METAL FILM
42	R51	1	ERJ-2GE0R00	PANASONIC	0	RES; SMT (0402); 0; JUMPER; JUMPER; 0.1000W
43	R52	1	ERJ-2RKF5100	PANASONIC	510	RES; SMT (0402); 510; 1%; +/-100PPM/DEGC; 0.1000W
44	R59	1	ERJ-2RKF1152	PANASONIC	11.5K	RES; SMT (0402); 11.5K; 1%; +/-100PPM/DEGC; 0.1000W
45	SPACER1-SPACER4	4	9032	KEYSTONE	9032	MACHINE FABRICATED; ROUND-THRU HOLE SPACER; NO THREAD; M3.5; 5/8IN; NYLON
46	TP15-TP19	5	5000	KEYSTONE	N/A	TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; RED; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
47	TP20-TP31	12	5001	KEYSTONE	N/A	TEST POINT; PIN DIA=0.1IN; TOTAL LENGTH=0.3IN; BOARD HOLE=0.04IN; BLACK; PHOSPHOR BRONZE WIRE SILVER PLATE FINISH;
48	U1	1	MAX20353	MAXIM	MAX20353	EVKIT PART- IC; WEARABLE POWER NAMAGEMENT SOLUTION; PACKAGE OUTLINE; WLP 56 PINS; 0.5MM PITCH; PKG. CODE: W563A4+1; PKG. OUTLINE: 21- 100104
49	U2	1	OPA569AIDWPR	TEXAS INSTRUMENTS	OPA569AIDWPR	IC; AMP; RAIL-TO-RAIL I/O; POWER AMPLIFIER; WSOIC20-EP 300MIL
50	U3	1	MAX8880EUT+	МАХІМ	MAX8880EUT+	IC; VREG; ULTRA-LOW-IQ LOW-DROPOUT LINEAR REGULATOR WITH POK; SOT23-6
51	U4	1	NC7WZ07P6X	FAIRCHILD SEMICONDUCTOR	NC7WZ07P6X	IC; BUF; TINY LOGIC ULTRA-HIGH SPEED DUAL BUFFER; SC70-6
52	PCB	1	MAX20353SYS	MAXIM	PCB	PCB:MAX20353SYS
53	MISC1, MISC2	2	3025010-03	QUALTEK ELECTRONICS CORP	3025010-03	CONNECTOR; MALE; USB-A_MINI-B; USB 4P(A)/M - USB MINI 5P(B)/M; STRAIGHT; 36IN
54	MISC3	1	MAXPICO2PMB#	MAXIM	MAXPICO2PMB#	ACCESSORY; BRD; PACKOUT; PICO2PMB ADAPTER BOARD
TOTAL		182				

MAX20353 EV System Schematic





MAX20353 EV System Schematic (continued)



MAX20353 EV System Schematic (continued)

Evaluates: MAX20353



MAX20353 EV System PCB Layout

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MAX20353 EV System—Silkscreen Top



MAX20353 EV System—GND Layer

MAX20353 EV System—Top Layer



MAX20353 EV System—SYS Layer

Evaluates: MAX20353



MAX20353 EV System PCB Layout (continued)

MAX20353 EV System—Bottom Layer



MAX20353 EV System—Silkscreen Bottom

Evaluates: MAX20353

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	3/21	Initial release	—
1	4/21	Updated the Bill of Materials, Schematic, and PCB Layout Diagram sections	21–28
2	8/21	Updated General Description, EV System Contents, Quick Start, and Detailed Description of Software sections, Figures 1, 2, and 4-15, and Bill of Materials; Added Fuel Gauge section	1-16, 18, 20, 23
3	1/22	Updated Hardware Setup section and Table 2	18, 20



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