MAX14600–MAX14605

USB Host Charger Identification/Adapter Emulators

General Description

The MAX14600–MAX14605 are third-generation USB 2.0 host charger identification devices that combine USB Hi-Speed analog switches with a USB adapter emulator circuit.

The devices support pass-through mode and auto mode. In charging downstream port (CDP) pass-through mode, the devices emulate the CDP function while supporting normal USB traffic. The MAX14600/MAX14603/MAX14605 have a pFET open-drain output ($\overline{CEN}$), and the MAX14601/MAX14604 have an nFET open-drain output (CEN) to restart the peripheral connected to the USB host.

All the devices support the CDP and standard downstream port (SDP) charging during the active state (S0) and support the dedicated charging port (DCP) charging during the standby state (S3/S4/S5). The MAX14603/MAX14604/MAX14605 support remote wake-up in standby mode. The MAX14602/MAX14605 offer backward-compatible CDP emulation upgrade to the MAX14566E.

The MAX14600–MAX14605 are available in an 8-pin (2mm x 2mm) TDFN package, and are specified over the -40°C to +85°C extended temperature range.

Applications

USB Host Data/Chargers including:

    Laptop and Desktop Computers

    USB Hubs

Flat-Panel Displays with USB
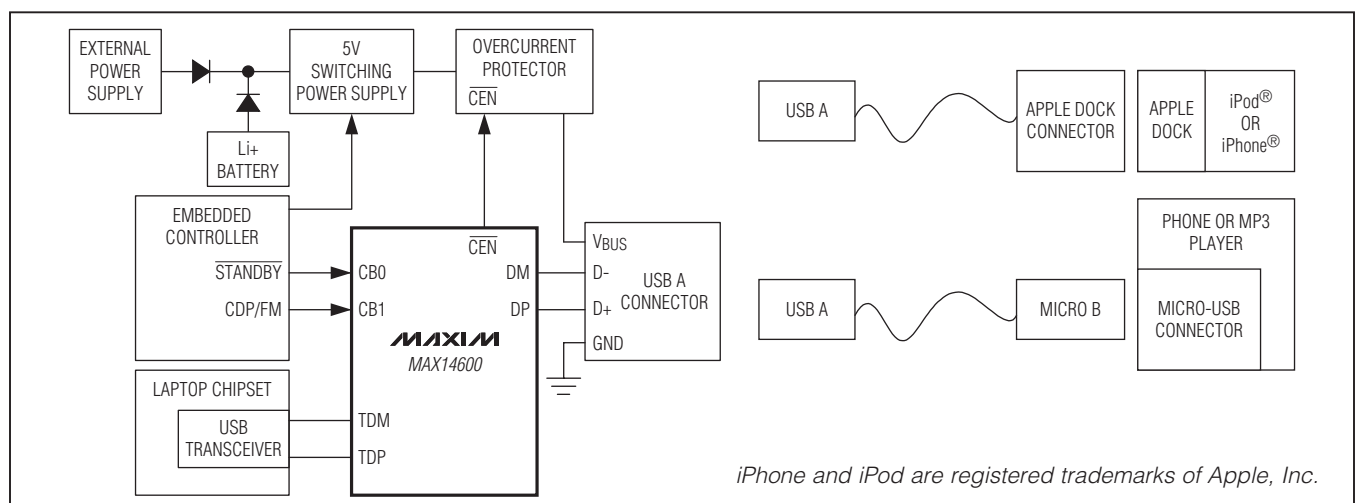
Media Players

Game Consoles

Benefits and Features

♦ **Improved Charger Interoperability**
 ✧ **USB CDP Emulation in S0 State**
 ✧ **Meets New USB Battery Charging (BC) Revision 1.2 Specification**
 ✧ **Backward Compatible with Previous USB BC Revisions**
 ✧ **Meets China YD/T1591-2009 Charging Specification**
 ✧ **Supports Standby Mode Charging for Apple and BC Revision 1.2-Compatible Devices**

♦ **Greater User Flexibility**
 ✧ **CB0 and CB1 Pins Control Multiple Automatic and Manual Charger States**

♦ **High Level of Integrated Features**
 ✧ **Supports Remote Wake-Up (MAX14603/ MAX14604/MAX14605)**
 ✧ **Low-Capacitance USB 2.0 Hi-Speed Switch to Change Charging Modes**
 ✧ **Automatic Current-Limit Switch Control**

♦ **Save Space on Board**
 ✧ **2mm x 2mm, 8-Pin TDFN Package**

Ordering Information/Selector Guide **appears at end of data sheet.**

For related parts and recommended products to use with this part, refer to **www.maxim-ic.com/MAX14600.related**.

Typical Operating Circuit

iPhone and iPod are registered trademarks of Apple, Inc.

For pricing, delivery, and ordering information, please contact Maxim Direct at 1-888-629-4642, or visit Maxim's website at www.maxim-ic.com.

USB Host Charger Identification/Adapter Emulators

ABSOLUTE MAXIMUM RATINGS

All voltages referenced to GND.

V_{CC}, TDP, TDM, CB0, CB1, DP, DM, $\overline{CEN}$, CEN.... -0.3V to +6.0V
Continuous Current into Any Terminal .... ±30mA
Continuous Power Dissipation (T_A = +70°C)
    TDFN (derate 11.9mW/°C above +70°C)................953.5mW

Operating Temperature Range .... -40°C to +85°C
Junction Temperature ....+150°C
Storage Temperature Range........................... -65°C to +150°C
Lead Temperature (soldering, 10s) ....+300°C
Soldering Temperature (reflow) ....+260°C

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

PACKAGE THERMAL CHARACTERISTICS (Note 1)

TDFN
    Junction-to-Ambient Thermal Resistance (θ_{JA}) ....84°C/W
    Junction-to-Case Thermal Resistance (θ_{JC}) ....37°C/W

Note 1: Package thermal resistances were obtained using the method described in JEDEC specification JESD51-7, using a four-layer board. For detailed information on package thermal considerations, refer to **www.maxim-ic.com/thermal-tutorial**.

ELECTRICAL CHARACTERISTICS

(V_{CC} = 3.0V to 5.5V, T_A = T_{MIN} to T_{MAX}, unless otherwise noted. Typical values are at V_{CC} = 5.0V, T_A = +25°C.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
POWER SUPPLY						
Power-Supply Range	V_{CC}	$V_{CB0} > V_{IH}$	3.0		5.5	V
		V_{CB0} = 0V (Note 3)	4.75		5.25	
Supply Current	I_{CC}	$V_{CB0} = V_{CB1} = V_{CC}$ = 5.25V, CM mode		50	100	µA
		$V_{CB0} = V_{CC}$ = 5.25V, V_{CB1} = 0V, PM mode		4	20	
		V_{CB0} = 0V, $V_{CB1} = V_{CC}$ = 5.25V, FM mode		10	50	
		$V_{CB0} = V_{CB1}$ = 0V, AM mode		130	200	
ANALOG SWITCH						
Analog-Signal Range	V_{DP}, V_{DM}		0		V_{CC}	V
On-Resistance TDP/TDM Switch	R_{ON}	$V_{TDP} = V_{TDM}$ = 0V to V_{CC}, $I_{TDP} = I_{TDM}$ = 10mA		3.5	6.5	Ω
On-Resistance Match Between Channels TDP/TDM Switch	ΔR_{ON}	V_{CC} = 5.0V, $V_{DP} = V_{DM}$ = 400mV, $I_{DP} = I_{DM}$ = 10mA		0.1		Ω
On-Resistance Flatness TDP/TDM Switch	R_{FLAT}	V_{CC} = 5.0V, $V_{DP} = V_{DM}$ = 0 to V_{CC}, $I_{DP} = I_{DM}$ = 10mA		0.1		Ω
On-Resistance of DP/DM Short	R_{SHORT}	V_{CB0} = 0V, $V_{CB1} = V_{CC}$, V_{DP} = 1V, R_{DM} = 20kΩ		70	120	Ω
Off-Leakage Current	I_{TDPOFF}, I_{TDMOFF}	V_{CC} = 3.6V, $V_{DP} = V_{DM}$ = 0.3V to 3.3V, $V_{TDP} = V_{TDM}$ = 3.3V to 0.3V	-250		+250	nA
On-Leakage Current	I_{DPON}, I_{DMON}	V_{CC} = 3.6V, $V_{DP} = V_{DM}$ = 3.3V to 0.3V, $V_{CB\_} = V_{CC}$	-250		+250	nA
DYNAMIC PERFORMANCE (Note 4)						
Turn-On Time	t_{ON}	V_{TDP} or V_{TDM} = 1.5V, R_L = 300Ω, C_L = 35pF, $V_{IH} = V_{CC}$, V_{IL} = 0V, Figure 1		300	800	µs

USB Host Charger Identification/Adapter Emulators

ELECTRICAL CHARACTERISTICS (continued)

(V_{CC} = 3.0V to 5.5V, T_A = T_{MIN} to T_{MAX}, unless otherwise noted. Typical values are at V_{CC} = 5.0V, T_A = +25°C.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Turn-Off Time	t_{OFF}	V_{TDP} or V_{TDM} = 1.5V, R_L = 300Ω, C_L = 35pF, V_{IH} = V_{CC}, V_{IL} = 0V, Figure 1 (Note 5)		1	5	µs
TDP, TDM Switch Propagation Delay	t_{PLH}, t_{PHL}	R_L = R_S = 50Ω		60		ps
Output Skew	t_{SK}	Skew between DP and DM when connected to TDP and TDM, R_L = R_S = 50Ω, Figure 2		40		ps
TDP, TDM Off-Capacitance	C_{OFF}	f = 1MHz, V_{BIAS} = 0V, V_{IN} = 500mV$_{P-P}$		2.0		pF
DP, DM On-Capacitance (Connected to TDP, TDM)	C_{ON}	f = 240MHz, V_{BIAS} = 0V, V_{IN} = 500mV$_{P-P}$		4.0	5.5	pF
-3dB Bandwidth	BW	R_L = R_S = 50Ω		1000		MHz
Off-Isolation	V_{ISO}	V_{TDP} or V_{DP} = 0dBm, R_L = R_S = 50Ω, f = 250MHz, Figure 3		-20		dB
Crosstalk	V_{CT}	V_{TDP} or V_{DP} = 0dBm, R_L = R_S = 50Ω, f = 250MHz, Figure 3		-25		dB
DPC INTERNAL RESISTORS						
DP/DM Short Pulldown	R_{PD}		320	500	730	kΩ
RP1/RP2 Ratio	RT_{RP}		1.4	1.5	1.55	—
RP1 + RP2 Resistance	R_{RP}		85	125	170	kΩ
RM1/RM2 Ratio	RT_{RM}		0.85	0.86	0.87	—
RM1 + RM2 Resistance	R_{RM}		60	93	125	kΩ
DPC COMPARATORS (Note 4)						
DM1 Comparator Threshold	V_{DM1F}	DM falling	40	41	42	%V_{CC}
DM1 Comparator Hysteresis				1		%
DM2 Comparator Threshold	V_{DM2F}	DM falling	6.31	7	7.6	%V_{CC}
DM2 Comparator Hysteresis				1		%
DP Comparator Threshold	V_{DPR}	DP rising	45	46	47	%V_{CC}
DP Comparator Hysteresis				1		%
CDP INTERNAL RESISTORS						
DP Pulldown Resistor	R_{DP_DWN}			14.25	24.8	kΩ
DM Pulldown Resistor	R_{DM_DWN}			14.25	24.8	kΩ
CDP LOW-SPEED COMPARATORS						
V_{DM_SRC} Voltage	V_{DM_SRC}	I_{LOAD} = 0 to 200µA, T_A = +25°C	0.5		0.7	V
V_{DAT_REF} Voltage	V_{DAT_REF}		0.25		0.4	V
V_{LGC} Voltage	V_{LGC}		0.8		2.0	V
I_{DP_SINK} Current	I_{DP_SINK}	V_{DP} = 0.15V to 3.6V	50		150	µA

USB Host Charger Identification/Adapter Emulators

ELECTRICAL CHARACTERISTICS (continued)

(V_{CC} = 3.0V to 5.5V, T_A = T_{MIN} to T_{MAX}, unless otherwise noted. Typical values are at V_{CC} = 5.0V, T_A = +25°C.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
LOGIC INPUTS (CB0, CB1)						
CB0/CB1 Input Logic-High	V_{IH}		1.4			V
CB0/CB1 Input Logic-Low	V_{IL}				0.4	V
CB0/CB1 Input Leakage Current	I_{IN}	V_{CC} = 5.5V, $0V \leq V_{IN} \leq V_{IL}$ or $V_{IH} \leq V_{IN} \leq V_{CC}$	-1		+1	µA
$\overline{CEN}$/CEN OUTPUTS						
V_{BUS} Toggle Time	t_{VBT}	CB0 = V_{IL} to V_{IH} or V_{IH} to V_{IL}	1	2	3	s
$\overline{CEN}$ Output Logic-High Voltage		CB0 = V_{IL} to V_{IH}, I_{SOURCE} = 2mA	V_{CC} - 0.4			V
$\overline{CEN}$ Output Leakage Current		V_{CC} = 5.5V, $V_{\overline{CEN}}$ = 0V, $\overline{CEN}$ deasserted			1	µA
CEN Output Logic-Low Voltage		CB0 = V_{IL} to V_{IH}, I_{SINK} = 2mA			0.4	V
CEN Output Leakage Current		V_{CC} = V_{CEN} = 5.5V, CEN deasserted			1	µA
ESD PROTECTION						
ESD Protection Level	V_{ESD}	HBM		±2		kV

Note 2: All units are 100% production tested at T_A = +25°C. Specifications over temperature are guaranteed by design.
Note 3: The device is operational from 3.0V to 5.5V. However, to have the valid Apple resistor-divider network, the V_{CC} supply must stay within 4.75V to 5.25V.
Note 4: Guaranteed by design.
Note 5: Does not include the delay by the state machine.
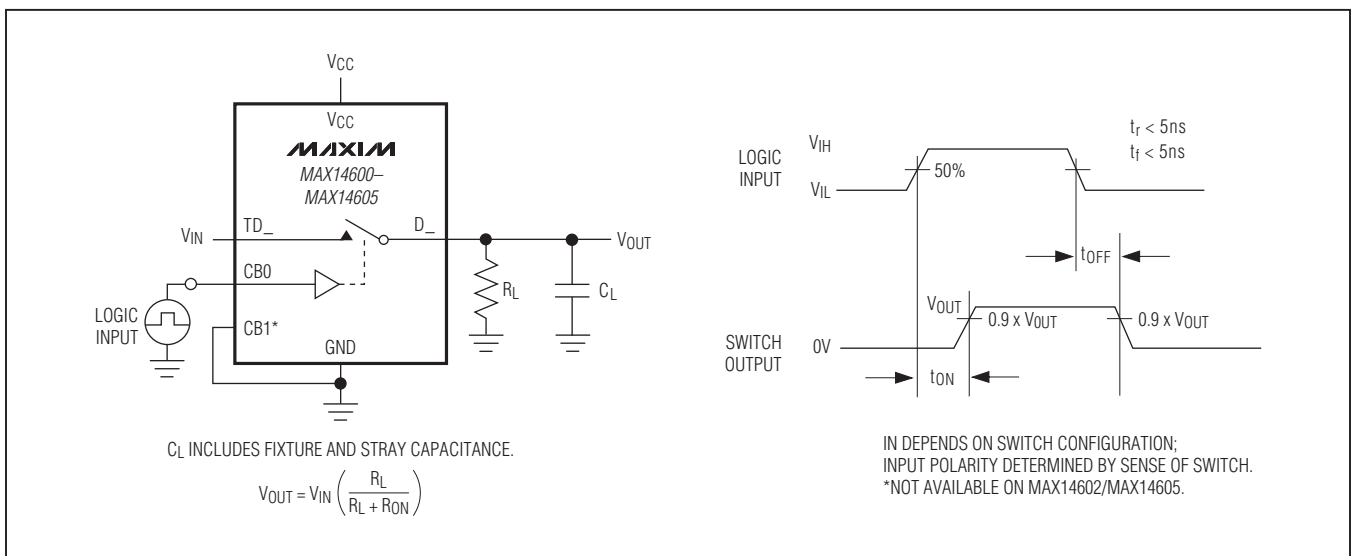
Test Circuits/Timing Diagrams

$$V_{OUT} = V_{IN} \left(\frac{R_L}{R_L + R_{ON}} \right)$$

C_L INCLUDES FIXTURE AND STRAY CAPACITANCE.

IN DEPENDS ON SWITCH CONFIGURATION;
INPUT POLARITY DETERMINED BY SENSE OF SWITCH.
*NOT AVAILABLE ON MAX14602/MAX14605.

Figure 1. Switching Time

USB Host Charger Identification/Adapter Emulators

RISE-TIME PROPAGATION DELAY = t_{PLHX} OR t_{PLHY}

FALL-TIME PROPAGATION DELAY = t_{PHLX} OR t_{PHLY}

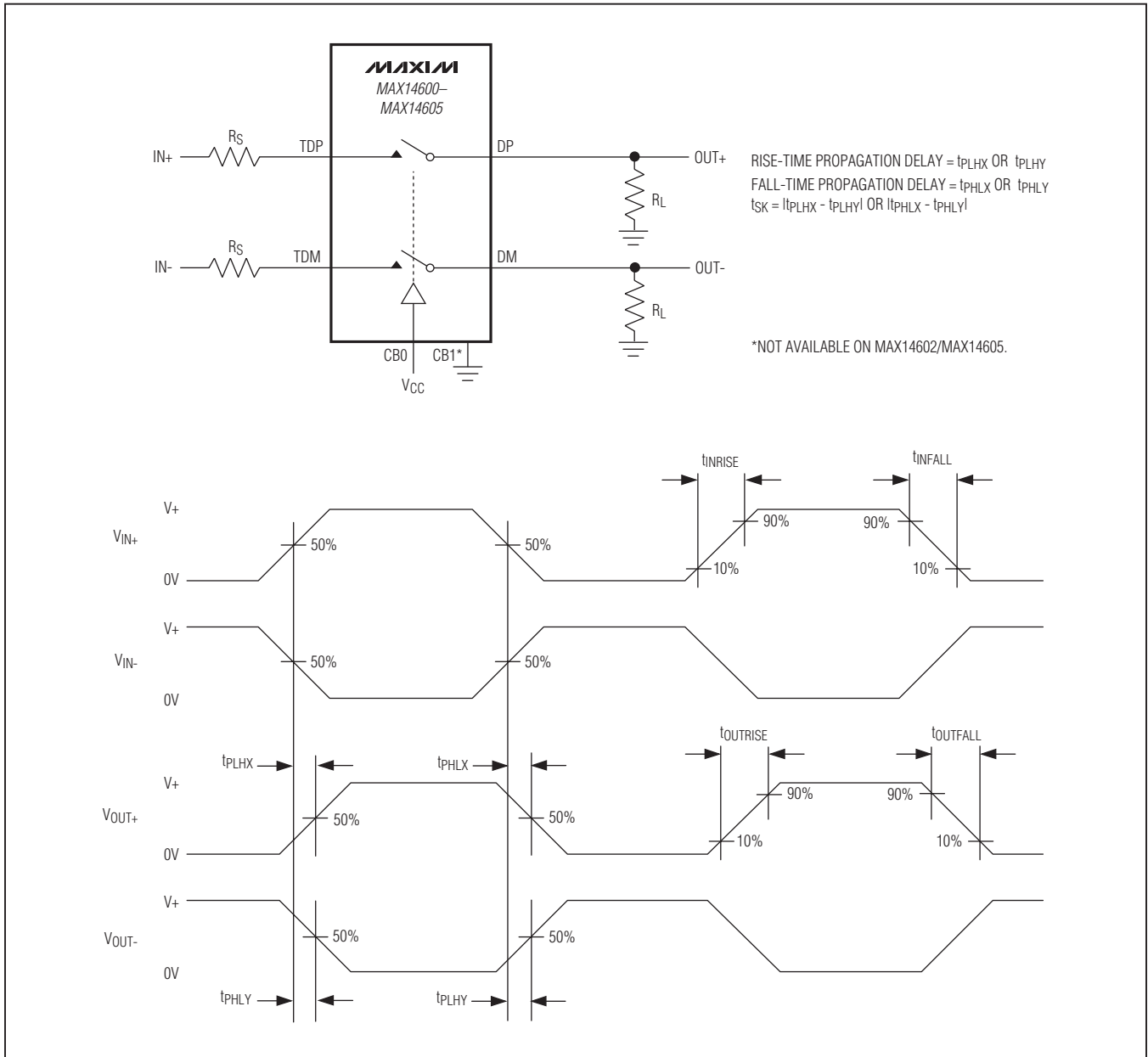$t_{SK} = |t_{PLHX} - t_{PLHY}|$ OR $|t_{PHLX} - t_{PHLY}|$

*NOT AVAILABLE ON MAX14602/MAX14605.

Figure 2. Output Signal Skew

USB Host Charger Identification/Adapter Emulators
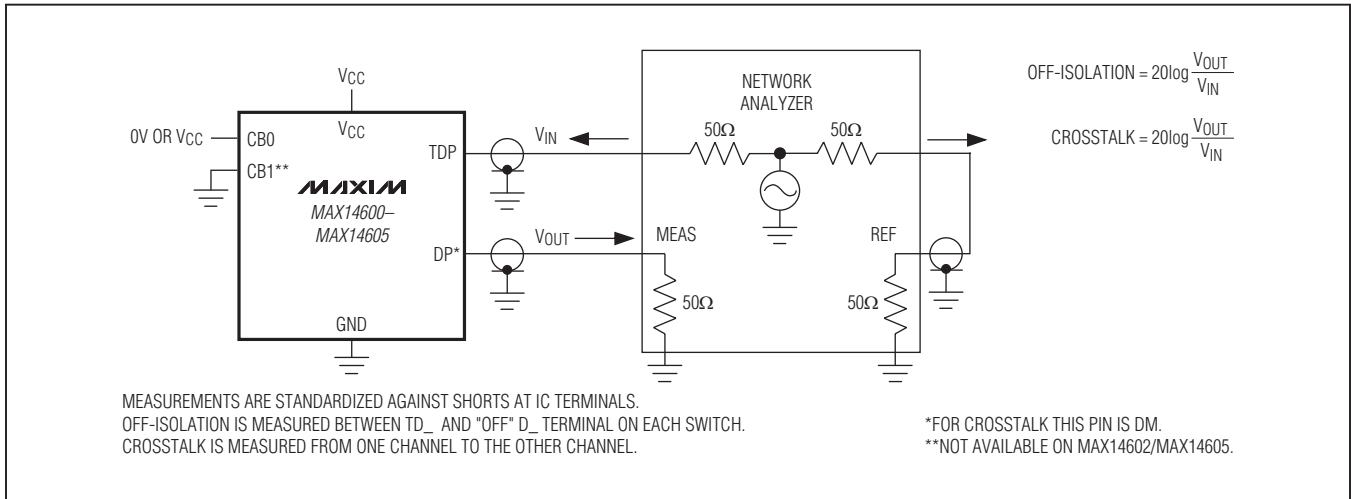
Test Circuits/Timing Diagrams (continued)

OFF-ISOLATION $= 20\log\dfrac{V_{OUT}}{V_{IN}}$

CROSSTALK $= 20\log\dfrac{V_{OUT}}{V_{IN}}$

MEASUREMENTS ARE STANDARDIZED AGAINST SHORTS AT IC TERMINALS.
OFF-ISOLATION IS MEASURED BETWEEN TD_ AND "OFF" D_ TERMINAL ON EACH SWITCH.
CROSSTALK IS MEASURED FROM ONE CHANNEL TO THE OTHER CHANNEL.

*FOR CROSSTALK THIS PIN IS DM.
**NOT AVAILABLE ON MAX14602/MAX14605.

Figure 3. Off-Isolation and Crosstalk

USB Host Charger Identification/Adapter Emulators

Typical Operating Characteristics

(T_A = +25°C, unless otherwise noted.)

TDP/TDM ON-RESISTANCE vs. SUPPLY VOLTAGE
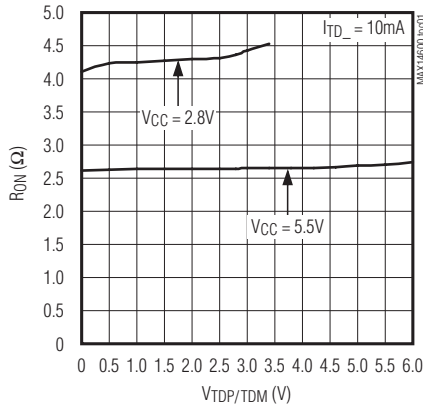
ON-RESISTANCE vs. $V_{TDP/TDM}$
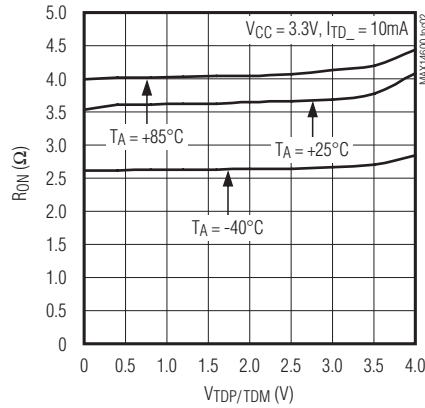
DP/DM SHORT ON-RESISTANCE vs. V_{DP}
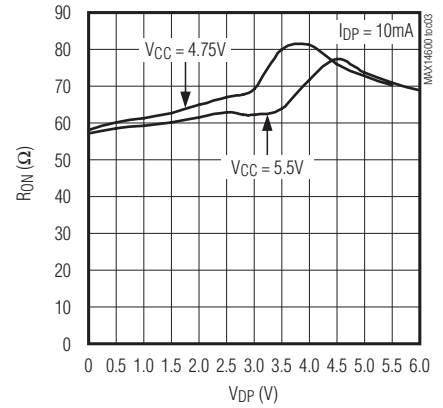
DP/DM SHORT ON-RESISTANCE vs. TEMPERATURE
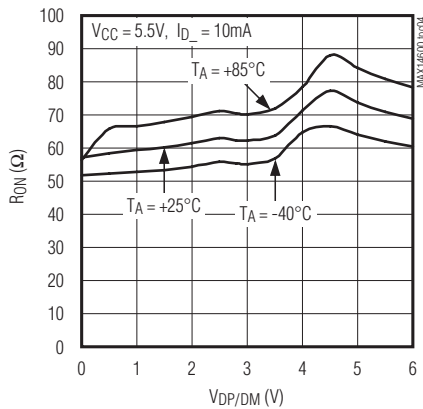
TDP/DP LEAKAGE CURRENT vs. TEMPERATURE
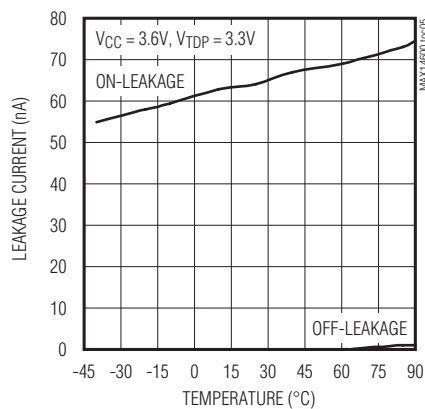
SUPPLY CURRENT vs. SUPPLY VOLTAGE
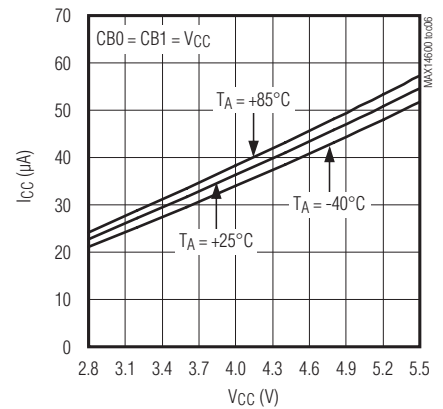
SUPPLY CURRENT vs. LOGIC LEVEL
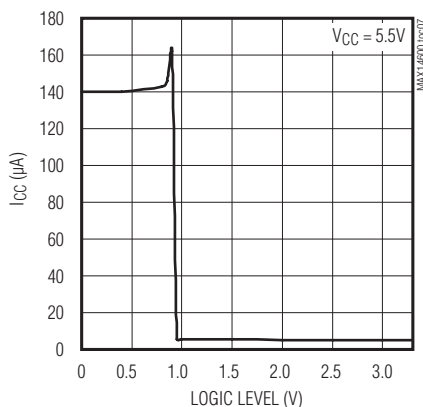
TURN-ON/TURN-OFF TIME vs. SUPPLY VOLTAGE
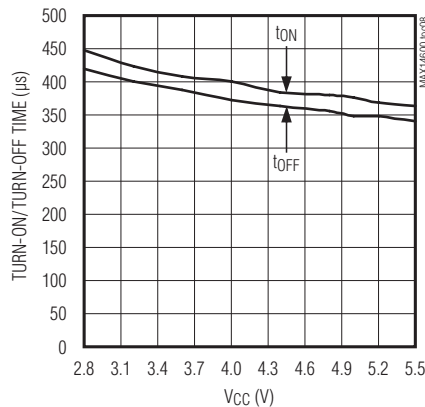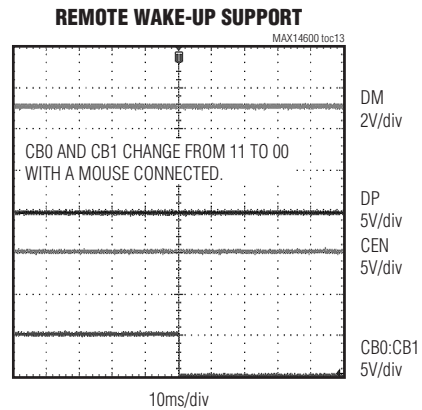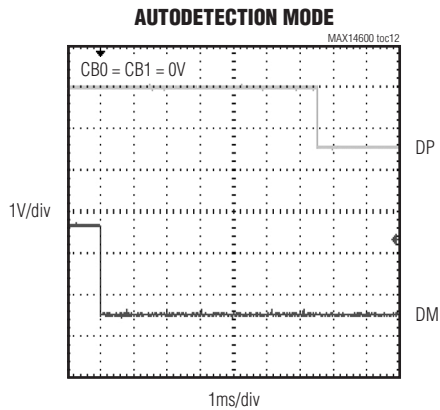

LOGIC-INPUT THRESHOLD vs. SUPPLY VOLTAGE
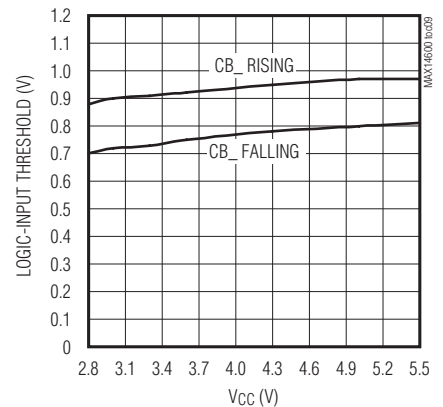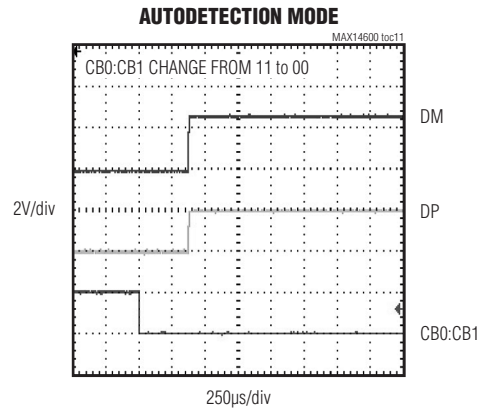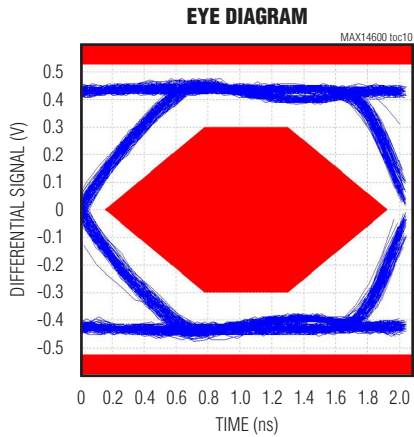
USB Host Charger Identification/Adapter Emulators

Typical Operating Characteristics (continued)

(T_A = +25°C, unless otherwise noted.)

EYE DIAGRAM

AUTODETECTION MODE

AUTODETECTION MODE

REMOTE WAKE-UP SUPPORT

USB Host Charger Identification/Adapter Emulators

Pin Configurations

TOP VIEW

CB0 TDM TDP V$_{CC}$
8   7   6   5

MAXIM
MAX14600
MAX14603

+   *EP

1   2   3   4
$\overline{CEN}$ DM DP CB1

TDFN

CB0 TDM TDP V$_{CC}$
8   7   6   5

MAXIM
MAX14601
MAX14604

+   *EP

1   2   3   4
CEN DM DP CB1

TDFN

CB0 TDM TDP V$_{CC}$
8   7   6   5

MAXIM
MAX14602
MAX14605

+   *EP

1   2   3   4
$\overline{CEN}$ DM DP I.C.

TDFN

*CONNECT EP TO GND.
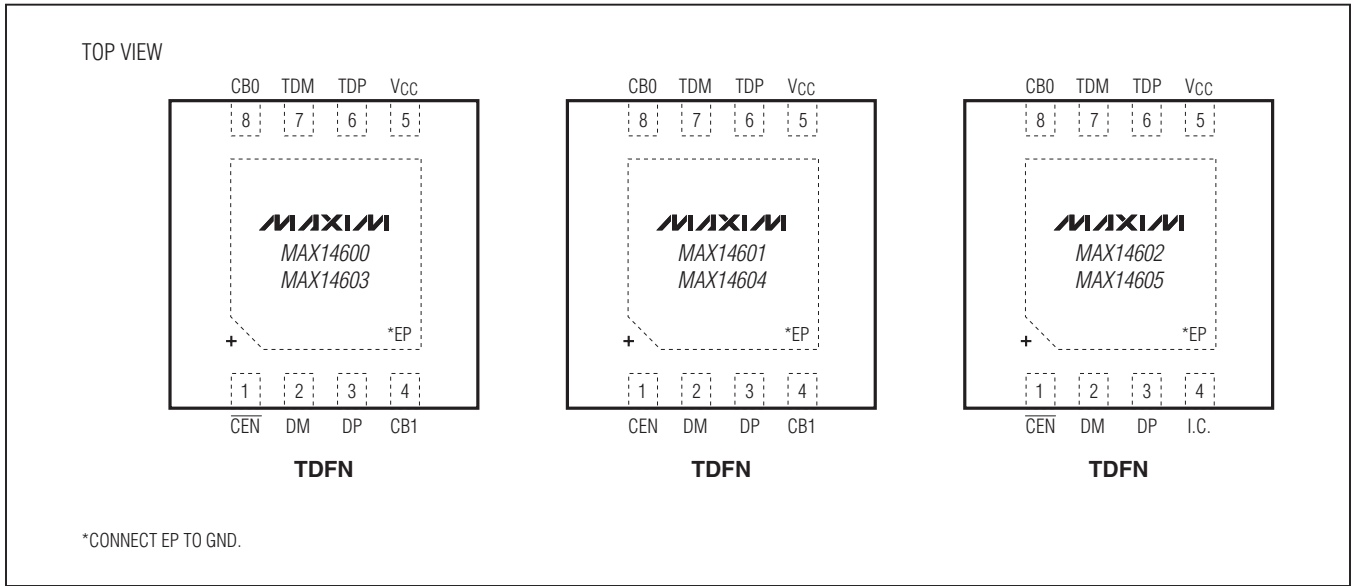
Pin Descriptions

PIN			NAME	FUNCTION
MAX14600/ MAX14603	MAX14601/ MAX14604	MAX14602/ MAX14605		
1	—	1	$\overline{CEN}$	Active-Low pMOSFET Open-Drain Output, Current-Limit Switch (CLS) Control Output. When CB0 changes from V_{IL} to V_{IH} or V_{IH} to V_{IL}, $\overline{CEN}$ is high.
—	1	—	CEN	nMOSFET Open-Drain Output, CLS Control Output. When CB0 changes from V_{IL} to V_{IH} or from V_{IH} to V_{IL}, CEN is low.
2	2	2	DM	USB Connector D- Connection
3	3	3	DP	USB Connector D+ Connection
4	4	—	CB1	Switch Control Bit. See Table 1.
—	—	4	I.C.	Internally Connected. Do not externally connect.
5	5	5	V$_{CC}$	Power Supply. Connect a 0.1µF capacitor between V$_{CC}$ and ground as close as possible to the device.
6	6	6	TDP	Host USB Transceiver D+ Connection
7	7	7	TDM	Host USB Transceiver D- Connection
8	8	8	CB0	Switch Control Bit. See Table 1.
—	—	—	EP	Exposed Pad. Connect EP to ground. For enhanced thermal dissipation, connect EP to a copper area as large as possible.

USB Host Charger Identification/Adapter Emulators

Functional Diagram

( ) FOR MAX14601 AND MAX14604 ONLY.
*CB1 IS NOT AVAILABLE ON MAX14602 AND MAX14605.
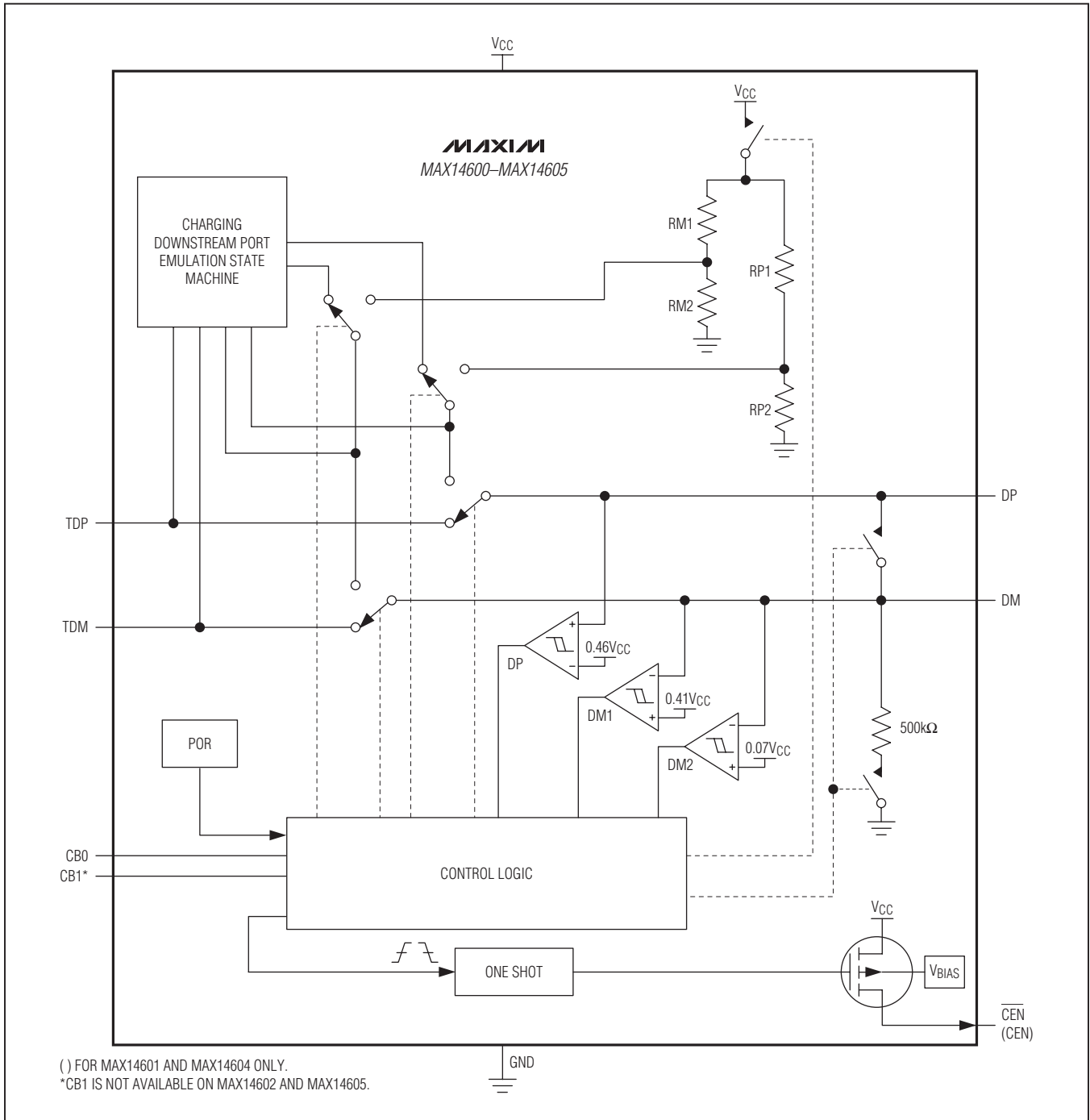
USB Host Charger Identification/Adapter Emulators

Detailed Description

The MAX14600–MAX14605 adapter emulator family has Hi-Speed USB analog switches that support USB hosts to identify the USB port as a charger port when the USB host is in a low-power mode and cannot enumerate USB devices. These Hi-Speed USB switches feature low 4pF (typ) on-capacitance and low 4Ω (typ) on-resistance. DP and DM can handle signals between 0V and 6V with any supply voltage.

Resistor-Dividers

The MAX14600–MAX14605 family features an internal resistor-divider for biasing data lines to provide support for Apple-compliant devices. When the MAX14600–MAX14605 family is not operated with the resistor-divider, the device disconnects the resistor-dividers from the supply voltage to minimize supply current requirements. The resistor-dividers are not connected in pass-through mode.

Switch Control

The MAX14600–MAX14605 family features dual digital inputs, CB0 and CB1, for mode selection. For the MAX14600/MAX14601/MAX14603/MAX14604, connect CB0 and CB1 to a logic-level low voltage for autodetection charger mode (AM). Change only CB1 to a logic-level high for forced dedicated charger mode (FM). Change only CB1 to a logic-level low for normal high-speed pass-through mode (PM). Connect CB0 and CB1 to a logic-level high for high-speed pass-through mode with CDP emulation (CM). See Table 1.

In CDP emulation mode, the peripheral device with CDP detection capability draws the charging current up to 1.5A immediately without USB enumeration. The MAX14602/MAX14605 have CB0 digital input control only (Table 2). The MAX14602/MAX14605 are pin-to-pin compatible with the MAX14566E, and CB0 and CB1 are connected together internally, which makes these devices easy upgrades for CDP emulation.

Table 1. Digital Input State for MAX14600/MAX14601/MAX14603/MAX14604

CB0	CB1	CHARGER/USB	MODE	STATUS
0	0	Charger	AM	Autodetection Charger Mode
0	1	Charger	FM	Force Dedicated Charger Mode: DP/DM shorted.
1	0	USB	PM	USB Pass-Through Mode: DP/DM connected to TDP/TDM.
1	1	USB	CM	USB Pass-Through Mode with CDP Emulation: Auto connects DP/DM to TDP/TDM depending on CDP status.

Table 2. Digital Input State for MAX14602/MAX14605

CB0	CHARGER/USB	MODE	STATUS
0	Charger	AM	Autodetection Charger Mode
1	USB	CM	USB Pass-Through Mode with CDP Emulation: Auto connects DP/DM to TDP/TDM depending on CDP status.

USB Host Charger Identification/Adapter Emulators

Autodetection

The MAX14600–MAX14605 family features autodetection charger mode for dedicated chargers and USB masters. Both CB0 and CB1 must be set low to activate autodetection charger mode.

In autodetection charger mode, the device monitors the voltages at DM and DP to determine the type of device attached. If the voltage at DM is 2.05V (typ) or higher and the voltage at DP is 2.3V (typ) or lower, the voltage stays unchanged. If the voltage at DM is forced below the 2.05V (typ) threshold, the internal switch disconnects DM and DP from the resistor-divider and DP and DM are shorted together for dedicated charging mode. Also, if the voltage at DP is forced higher than the 2.3V (typ) threshold, the internal switch disconnects DM and DP from the resistor-divider and DP and DM are shorted together for dedicated charging mode.

Once the charging voltage is removed, the short between DP and DM is disconnected for normal operation.

Auto Peripheral Reset

The MAX14600–MAX14605 family features an auto current-limit switch-control output. This feature resets the peripheral connected to V_{BUS} in the event the USB host switches to or from standby mode. $\overline{CEN}$ or CEN provide a 2s (typ) pulse on the rising or falling edge of CB0 (Figure 4 and Figure 5.) With the MAX14603/MAX14604/MAX14605, the auto peripheral reset is suspended in case of CB0 and CB1 transition from 11 to 00 as long as the peripheral remains connected. See the Remote Wake-Up Support section for more information.

USB Pass-Through Mode with CDP Emulation

The MAX14600–MAX14605 family features a pass-through mode with CDP emulation. This is to support the higher charging current capability during the pass-through mode in normal USB operation (S0 state). The peripheral device equipped with CDP detection capability could draw a charging current as defined
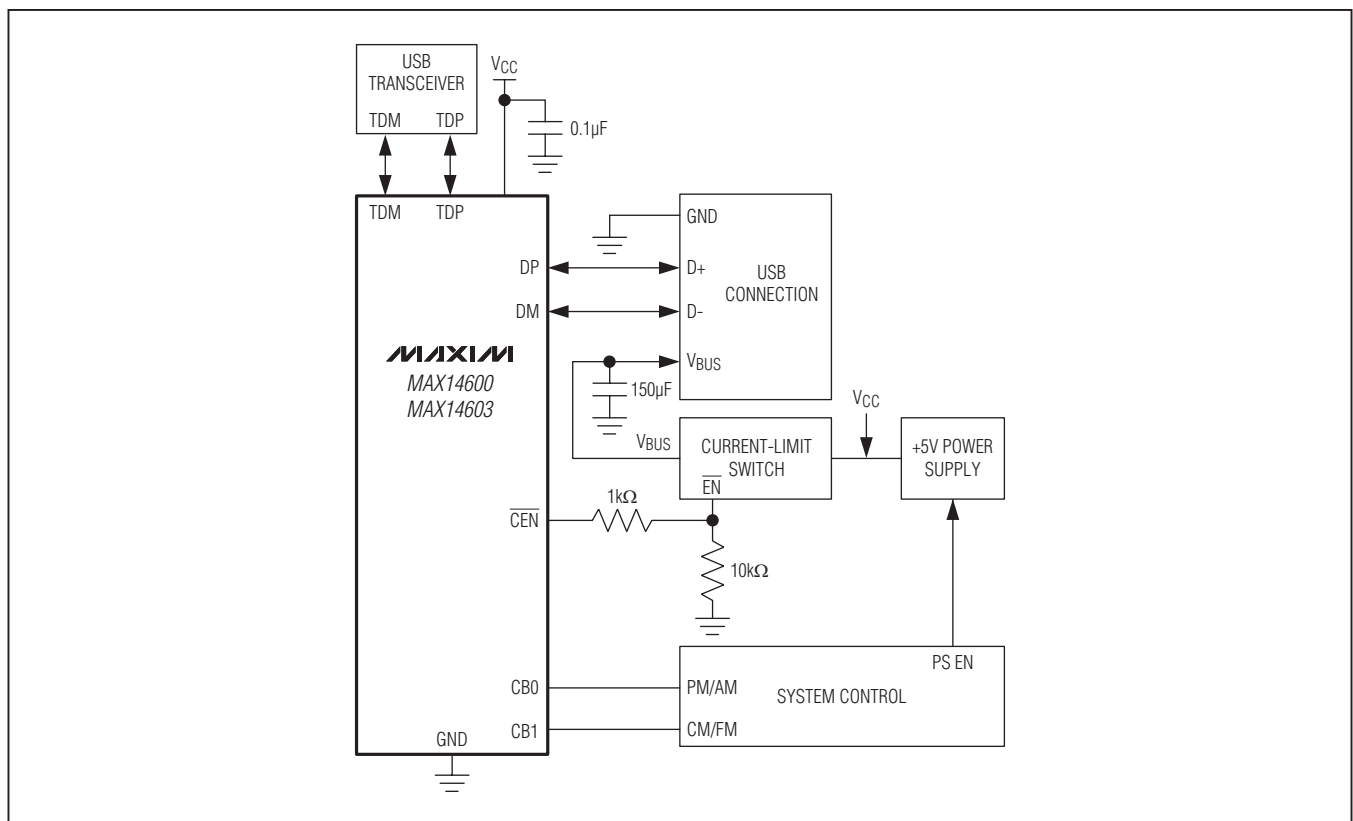

Figure 4. MAX14600/MAX14603 Peripheral Reset Applications Diagram

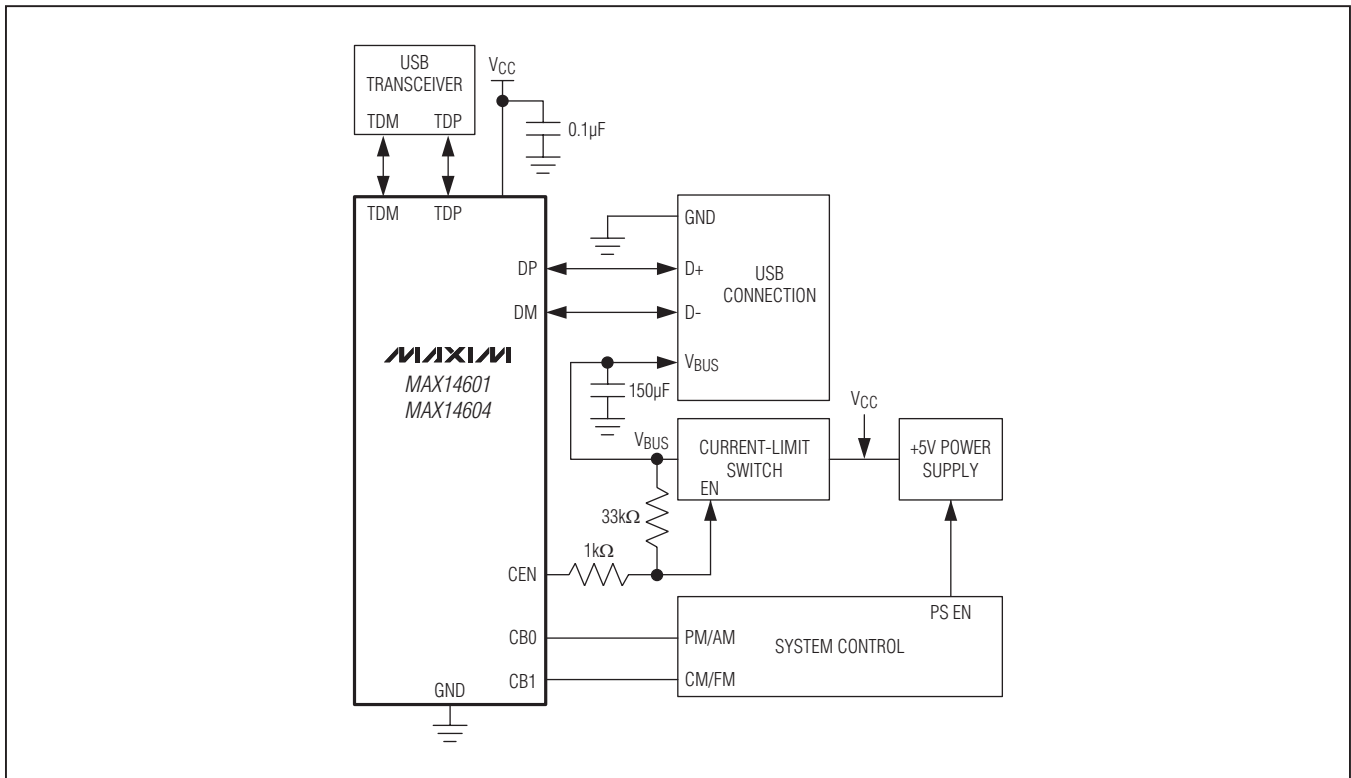# USB Host Charger Identification/Adapter Emulators

Figure 5. MAX14601/MAX14604 Peripheral Reset Applications Diagram

Table 3. Different Power States

STATE	DESCRIPTION
S0	System on.
S1	Power to the CPU(s) and RAM is maintained; devices that do not indicate they must remain on can be powered down.
S2	CPU is powered off.
S3	Standby (suspend to RAM). System memory context is maintained, and all other system context is lost.
S4	Hibernate. Platform context is maintained.
S5	Soft off.

in USB Battery Charger Specification 1.2 when the charging host supports the CDP mode. This is a useful feature since most host USB transceivers do not have the CDP function. Table 3 shows the different power states of S0–S5.

Bus Voltage Discharge

The MAX14601/MAX14604 auto current-limit switch-control output can be used to discharge the V_{BUS} during V_{BUS} reset. When the system controls the current limit switch for V_{BUS} toggle, the output capacitor can be discharged slowly depending upon the load. If fast discharge of the V_{BUS} is desired, the CEN output can be used to discharge the V_{BUS} (Figure 6.)

Data Contact Detect Support

The MAX14600–MAX14605 family support USB devices that require detecting the USB data lines prior to charging. When a USB Revision 1.2-compliant device is attached, the USB data lines DP and DM are shorted together. The short remains until it is detected by the USB device. This feature guarantees appropriate charger detection if a USB Revision 1.2-compliant device is attached. The autodetection charger mode is activated after the data contact detect is established. CB0 and CB1 must be set low to activate data contact detect support.
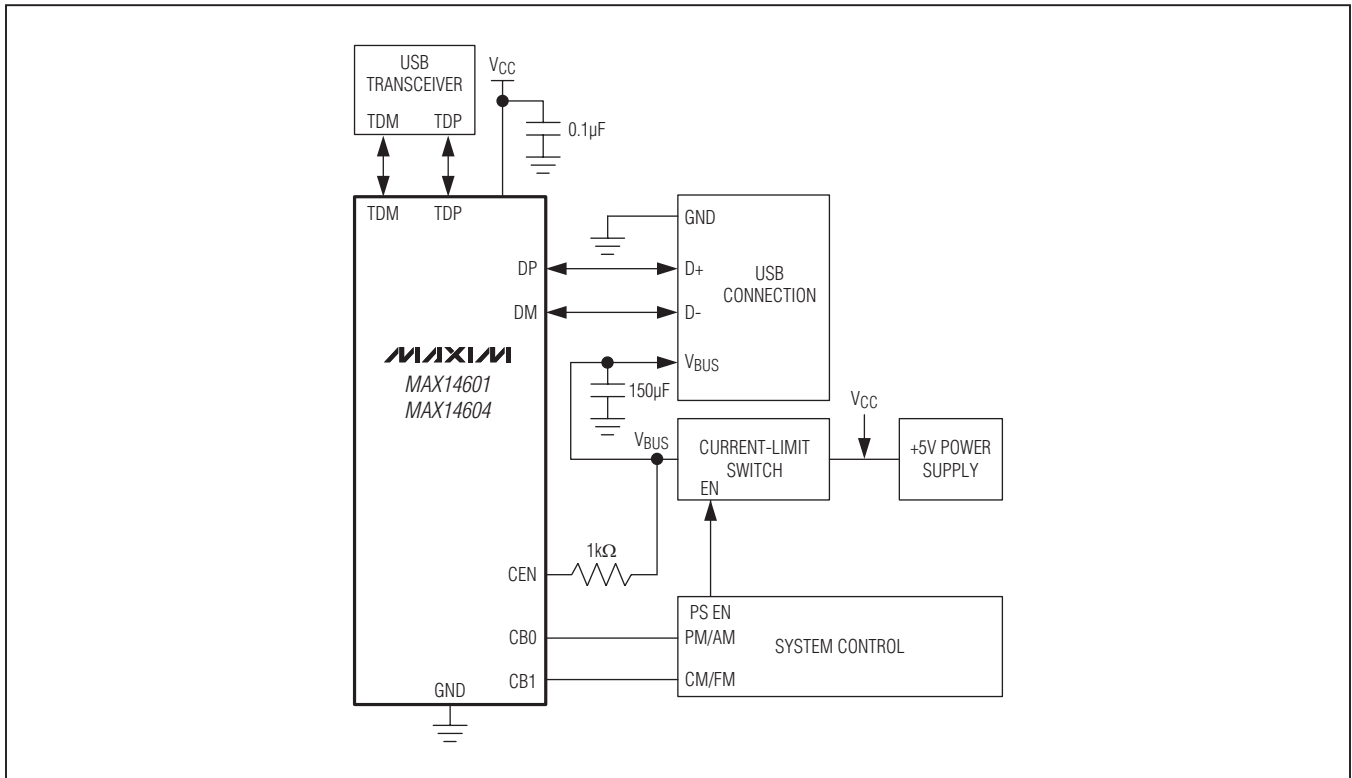
USB Host Charger Identification/Adapter Emulators

Figure 6. MAX14601/MAX14604 V_{BUS} Discharge Circuit

Remote Wake-Up Support

The MAX14603/MAX14604/MAX14605 feature remote wake-up if pass-through mode with CDP emulation is used prior to transitioning to auto mode in standby state (S3). If the peripheral device is connected and remains in the USB port during S0 state, the MAX14600 maintains the pass-through mode until it is removed. If this feature is not needed, such as in battery-powered mode, the embedded control could cancel the remote wake-up by toggling the V_{BUS} as it moves into the standby state.

Backward Compatibility

The MAX14602/MAX14605 offer easy backward-compatible CDP emulation upgrade to the MAX14566E.

ESD Test Conditions

ESD performance depends on a variety of conditions. Contact Maxim for a reliability report that documents test methodology and results.

Extended ESD Protection (Human Body Model)

ESD-protection structures are incorporated on all pins to protect against electrostatic discharges up to ±2kV (Human Body Model) encountered during handling and assembly. The ESD structures withstand high ESD both in normal operation and when the device is powered down. After an ESD event, the device continues to function without latchup (Figure 7a and Figure 7b).

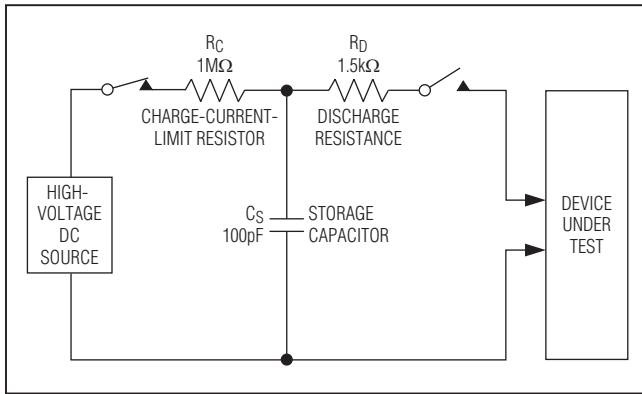# USB Host Charger Identification/Adapter Emulators
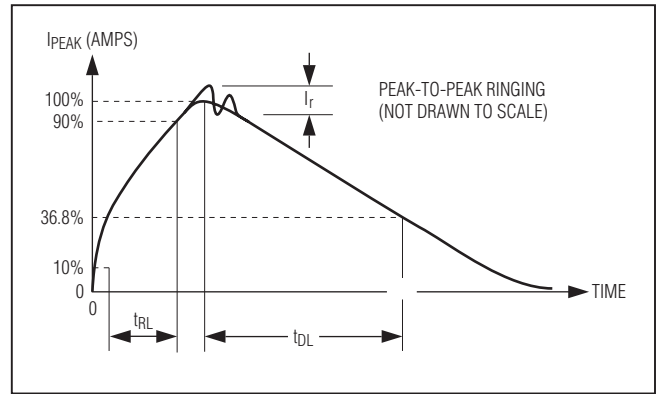

Figure 7a. Human Body ESD Test Model

Figure 7b. Human Body Current Waveform

Ordering Information/Selector Guide

PART	TEMP RANGE	MODE CONTROL	CLS CONTROL	REMOTE WAKE-UP	PIN-PACKAGE
MAX14600ETA+T	-40°C to +85°C	CB0, CB1	$\overline{CEN}$	No	8 TDFN-EP*
MAX14601ETA+T**	-40°C to +85°C	CB0, CB1	CEN	No	8 TDFN-EP*
MAX14602ETA+T	-40°C to +85°C	CB0	$\overline{CEN}$	No	8 TDFN-EP*
MAX14603ETA+T**	-40°C to +85°C	CB0, CB1	$\overline{CEN}$	Yes	8 TDFN-EP*
MAX14604ETA+T	-40°C to +85°C	CB0, CB1	CEN	Yes	8 TDFN-EP*
MAX14605ETA+T**	-40°C to +85°C	CB0	$\overline{CEN}$	Yes	8 TDFN-EP*

+Denotes a lead(Pb)-free/RoHS-compliant package.
T = Tape and reel.
*EP = Exposed pad.
**Future product—contact factory for availability.

Chip Information

PROCESS: BiCMOS

Package Information

For the latest package outline information and land patterns (footprints), go to **www.maxim-ic.com/packages**. Note that a "+", "#", or "-" in the package code indicates RoHS status only. Package drawings may show a different suffix character, but the drawing pertains to the package regardless of RoHS status.

PACKAGE TYPE	PACKAGE CODE	OUTLINE NO.	LAND PATTERN NO.
8 TDFN-EP	T822+1	**21-0168**	**90-0064**

USB Host Charger Identification/Adapter Emulators

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	6/11	Initial release	—

Maxim Integrated Products, 120 San Gabriel Drive, Sunnyvale, CA 94086 408-737-7600 _____ **16**