

Dual USB Power Distribution Switch

Features

- Compliant to USB specifications
- 2.7V to 5.5V operating range
- 150 mA minimum continuous load current per channel
- 400mΩ typical on-resistance
- Fast-acting short circuit protection with thermal shutdown
- Integrated filter eliminates false overcurrent flag assertions
- Individual open-drain fault flag pins with transient filter
- 3V/5V-compatible enable inputs
- Active-high (-1) and active-low (-2) versions
- Reverse-current blocking in off mode (no “body diode”)
- Soft-start circuit
- 100 μ A maximum on-state supply current
- <1 μ A typical off-state supply current
- -40°C to 85°C operation

Applications

- USB keyboard bus-powered hubs
- USB bus-powered docking stations
- Note Book PCs
- PDAs
- General purpose power distribution applications
- PC board hot swap
- Inrush current-limiting

General Description

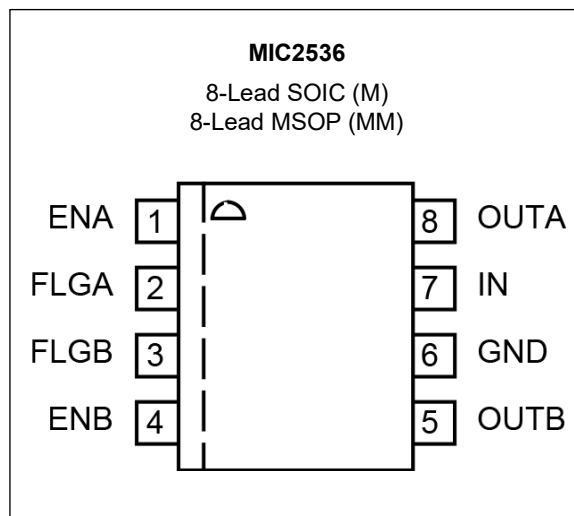
The MIC2536 is a cost-effective high-side power switch, with two independently controlled channels, optimized for bus-powered Universal Serial Bus (USB) applications. Few external components are necessary to satisfy USB requirements.

Each switch channel of the MIC2536 will supply up to 100 mA as required for USB bus-powered downstream devices. Fault current is limited to typically 275 mA by fast-acting current-limit circuitry which minimizes voltage droop on the upstream port during fault conditions. A flag output with transient filter indicates fault conditions to the local USB controller but will ignore short flag signals resulting from inrush current during hot plug-in events.

Soft start eliminates the momentary voltage droop on other ports that may occur when the switch is enabled in bus-powered applications. Additional features include thermal shutdown to prevent catastrophic switch failure from high-current loads and 3.3V and 5V logic compatible enable inputs.

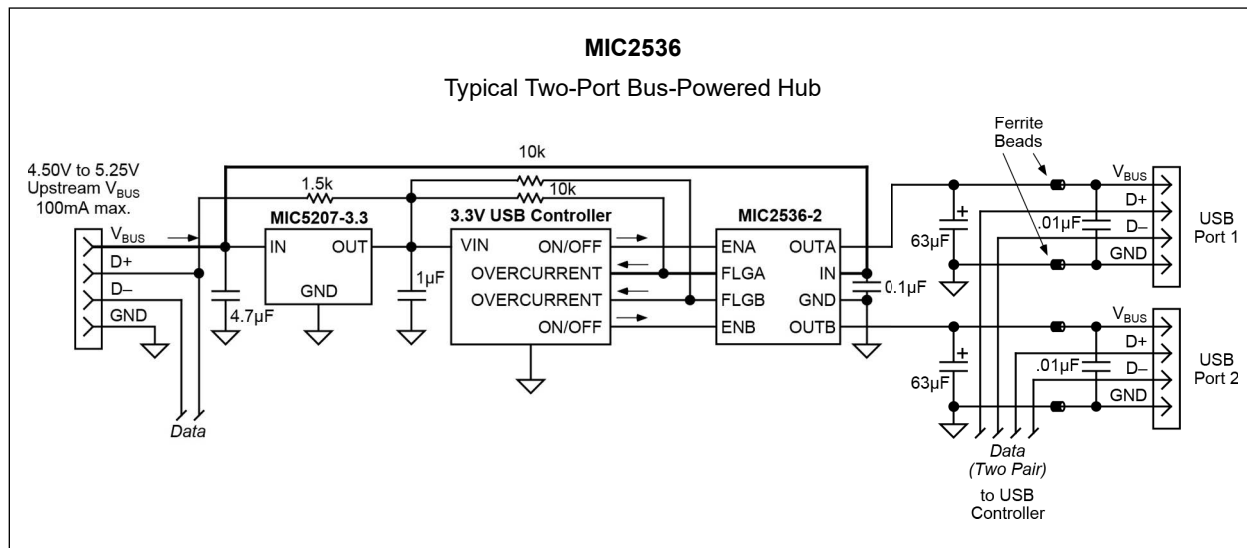
The MIC2536 is available in active-high and active-low versions in 8-lead SOIC and MSOP.

Package Types

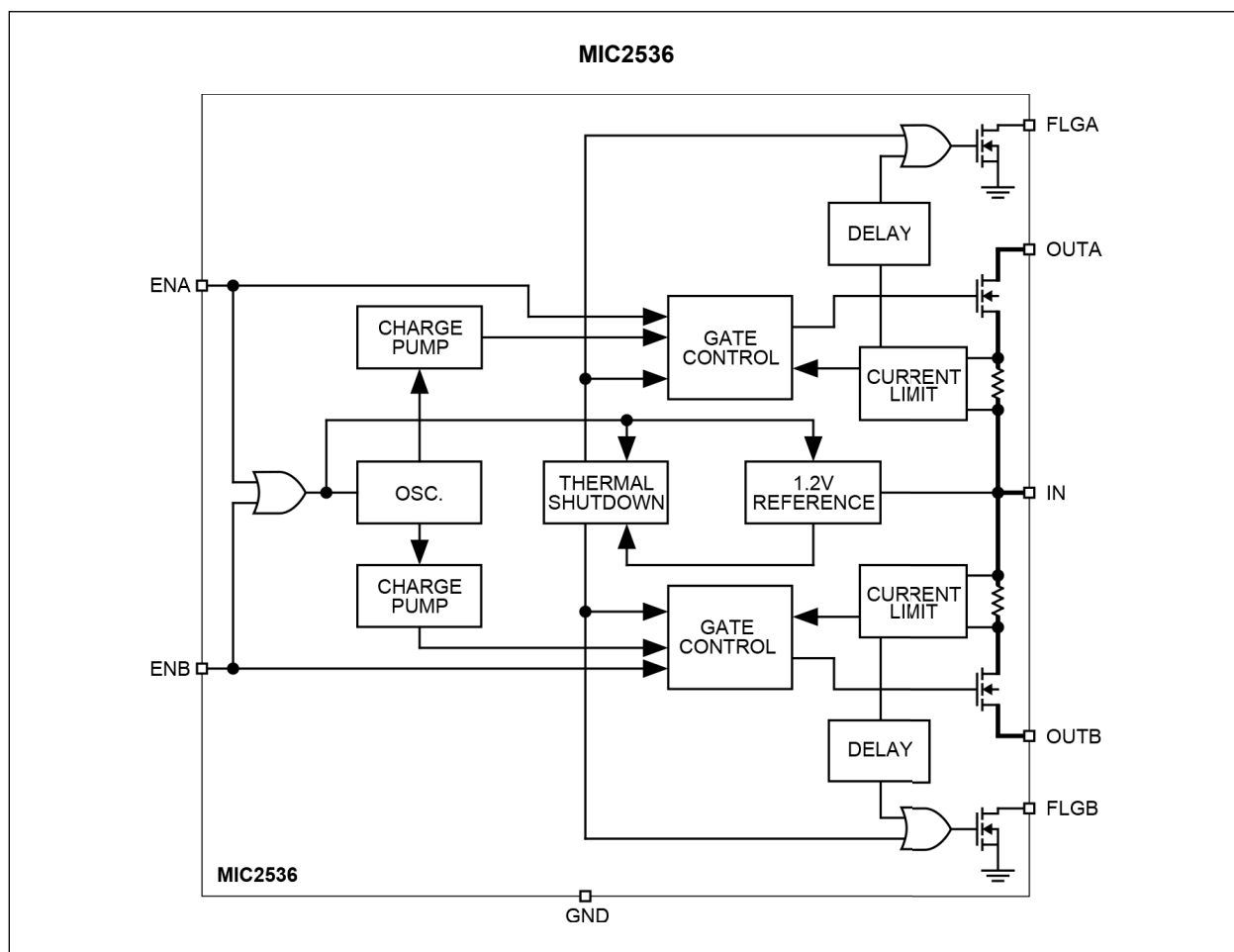


MIC2536

Typical Application Circuits



Functional Block Diagram



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings †

Supply Voltage (V_{IN})	+6V
Fault Flag Voltage (V_{FLG})	+6V
Fault Flag Current (I_{FLG})	25 mA
Output Voltage (V_{OUT})	+6V
Output Current (I_{OUT})	Internally Limited
Control Input (V_{EN})	–0.3V to V_{IN} +2V
ESD Rating (Note 1)	1 kV

Operating Ratings ‡

Supply Voltage (V_{IN})	+2.7V to +5.5V
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† **Notice:** Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational sections of this specification is not intended. Exposure to maximum rating conditions for extended periods may affect device reliability.

‡ **Notice:** The device is not guaranteed to function outside its operating ratings.

Note 1: Devices are ESD sensitive. Handling precautions recommended. Human body model, 1.5k in series with 100 pF.

ELECTRICAL CHARACTERISTICS

$V_{IN} = +5V$; $T_A = 25^\circ C$, bold values indicate $-40^\circ C \leq T_A \leq +85^\circ C$; unless noted.						
Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Supply Current	I_{VIN}	—	0.75	5	μA	both switches off, OUTA–B = open, Note 1
		—	60	100	μA	both switches on, OUTA–B = open, Note 1
Enable Input Threshold	V_{EN}	—	1.7	2.4	V	Low-to-high transition, Note 1
		0.8	1.5	—	V	High-to-low transition, Note 1
Enable Input Current	I_{EN}	—	0.01	1	μA	$V_{EN} = 0V$ to 5.5V
Enable Input Capacitance	C_{EN}	—	1	—	pF	Note 2
Switch Resistance	R_{ON}	—	400	700	m Ω	Single switch, $I_{OUT} = 100$ mA
Output Turn-On Delay	t_{ON}	—	1.5	—	ms	$R_L = 50\Omega$, $C_L = 1$ μF
Output Turn-On Rise Time	t_R	—	1.4	—	ms	$R_L = 50\Omega$, $C_L = 1$ μF
Output Turn-Off Delay	t_{OFF}	—	130	—	μs	$R_L = 50\Omega$, $C_L = 1$ μF
Output Turn-Off Fall Time	t_F	—	115	—	μs	$R_L = 50\Omega$, $C_L = 1$ μF
Output Leakage Current	OUT_{LEAK}	—	1	10	μA	Each output (switch off)
Current Limit Threshold	I_{LIM_TH}	—	—	500	mA	Ramped load applied to enable output
Short Circuit Current Limit	I_{SC}	150	275	400	mA	Each output (enabled into load), $V_{OUT} = 0V$

Note 1: Off is $\leq 0.8V$ and on is $\geq 2.4V$ for the MIC2536-1. Off is $\geq 2.4V$ and on is $\leq 0.8V$ for the MIC2536-2. The enable input has approximately 200 mV of hysteresis.

2: Guaranteed by design. Not production tested.

MIC2536

ELECTRICAL CHARACTERISTICS (CONTINUED)

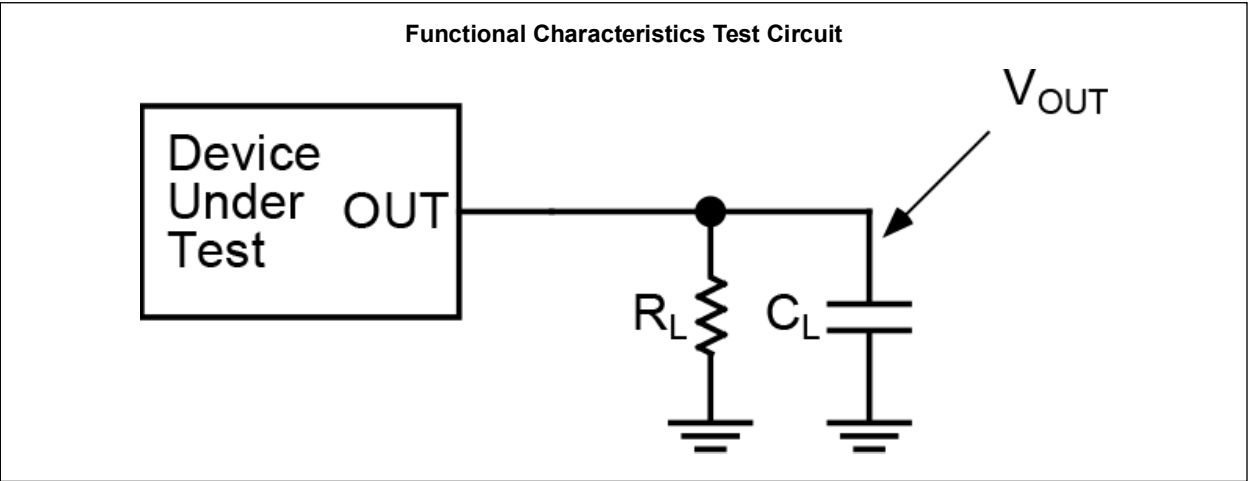
$V_{IN} = +5V$; $T_A = 25^{\circ}C$, bold values indicate $-40^{\circ}C \leq T_A \leq +85^{\circ}C$; unless noted.						
Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Current Limit Response	t_{CL}	—	10	—	μs	$V_{OUT} = 0V$ to $I_{OUT} = I_{LIMIT}$ (short applied to output), Note 2
Flag Response Delay	t_D	5	13	20	ms	$V_{IN} = 5V$, apply $V_{OUT} = 0V$ until FLG low
		—	13	—	ms	$V_{IN} = 3.3V$, apply $V_{OUT} = 0V$ until FLG low
Overtemperature Shutdown Threshold	T_J	—	135	—	$^{\circ}C$	T_J increasing, Note 2
		—	125	—	$^{\circ}C$	T_J decreasing, Note 2
Error Flag Output Resistance	R_{FLAG}	—	10	20	Ω	$V_{IN} = 5V$, $I_L = 10\text{ mA}$
		—	15	30	Ω	$V_{IN} = 3.3V$, $I_L = 10\text{ mA}$
Error Flag Off Current	I_{FLAG}	—	0.01	1	μA	$V_{FLAG} = 5V$

- Note 1:** Off is $\leq 0.8V$ and on is $\geq 2.4V$ for the MIC2536-1. Off is $\geq 2.4V$ and on is $\leq 0.8V$ for the MIC2536-2. The enable input has approximately 200 mV of hysteresis.
- 2:** Guaranteed by design. Not production tested.

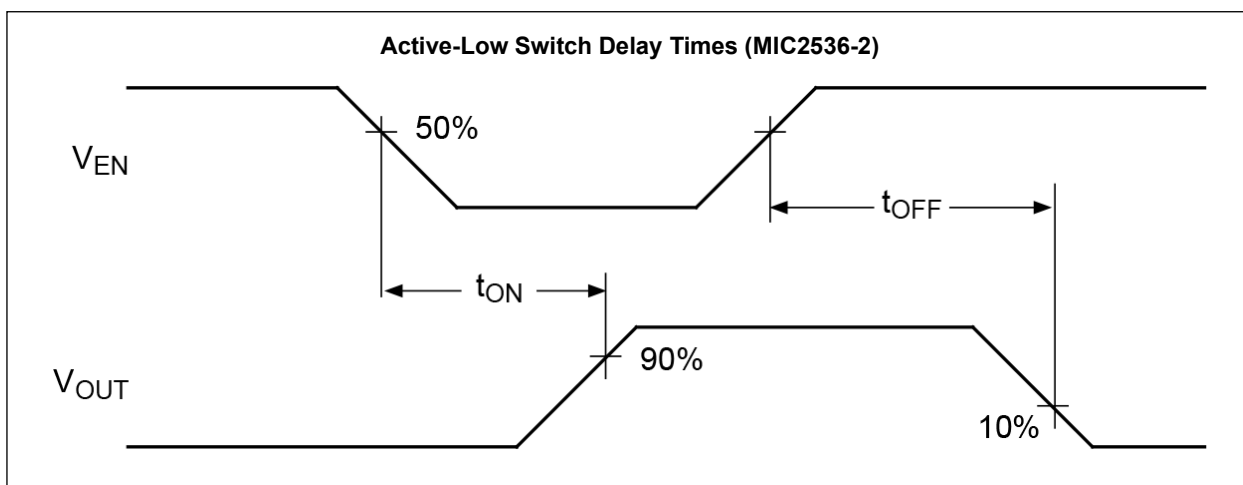
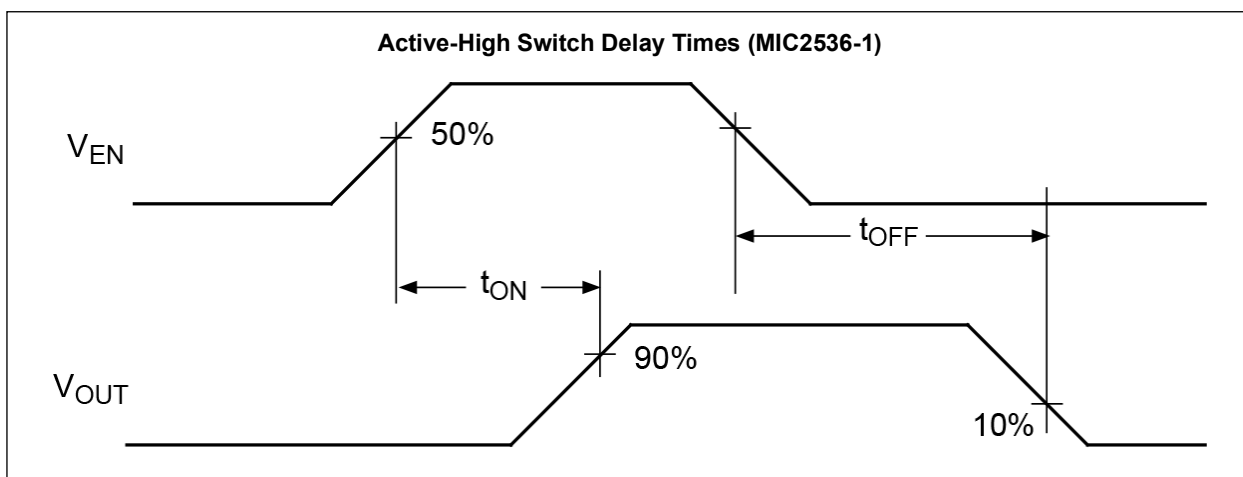
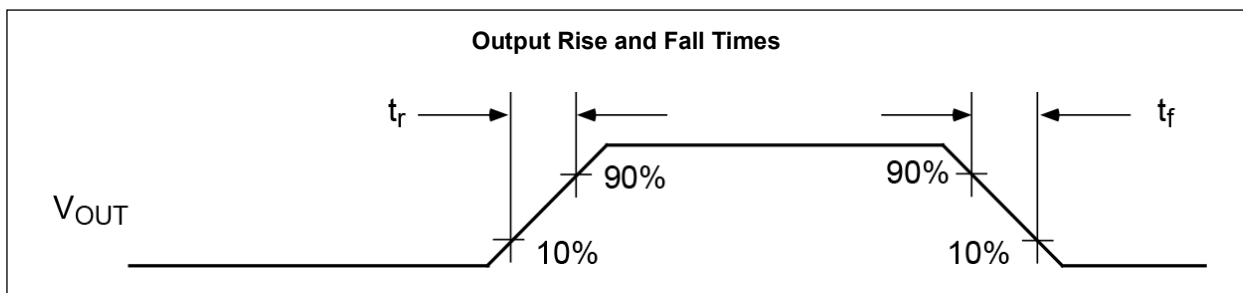
TEMPERATURE SPECIFICATIONS

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Ambient Operating Temperature	T_A	-40	+25	+85	$^{\circ}C$	—
Lead Temperature	—	—	260	—	$^{\circ}C$	Soldering, 5 seconds
Storage Temperature	T_S	-65	—	+150	$^{\circ}C$	—
Thermal Resistance for SOIC	θ_{JA}	—	160	—	$^{\circ}C/W$	—
Thermal Resistance for MSOP	θ_{JA}	—	206	—		—

Test Circuit



Timing Diagrams



2.0 TYPICAL PERFORMANCE CURVES

Note: The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be outside the specified operating range (e.g., outside specified power supply range) and therefore outside the warranted range.

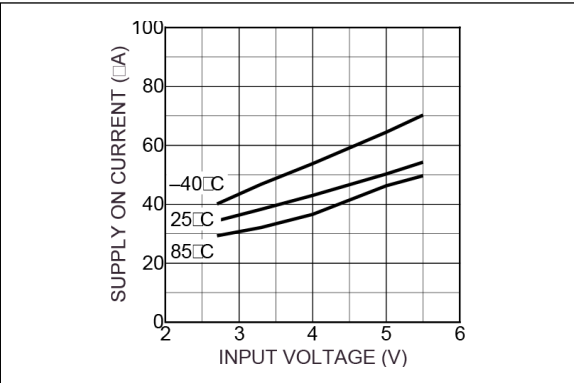


FIGURE 2-1: Supply On Current vs. Input Voltage.

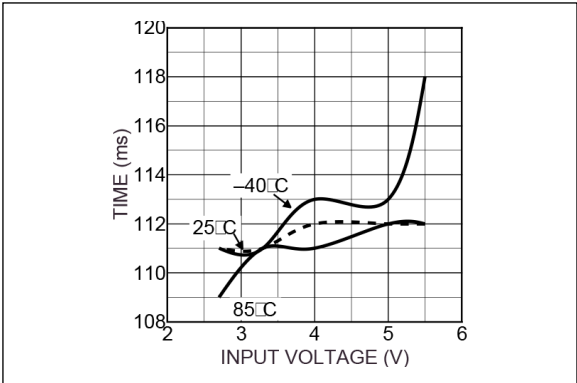


FIGURE 2-4: Output Fall Time vs. Input Voltage.

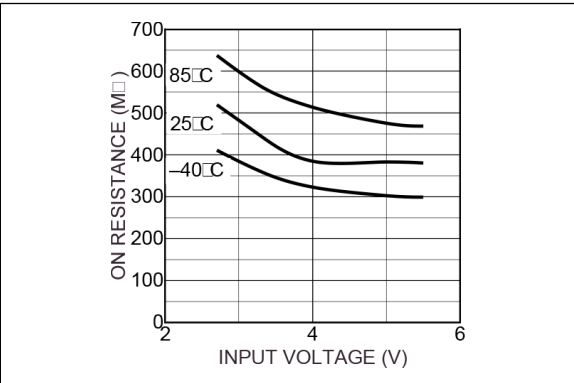


FIGURE 2-2: Output On-Resistance vs. Input Voltage.

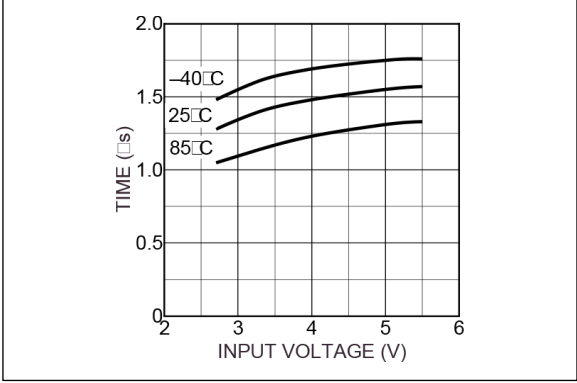


FIGURE 2-5: Control Voltage vs. Input Voltage VEN Falling.

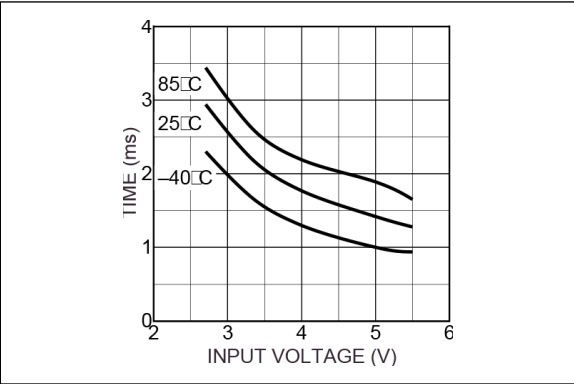


FIGURE 2-3: Output Rise Time vs. Input Voltage.

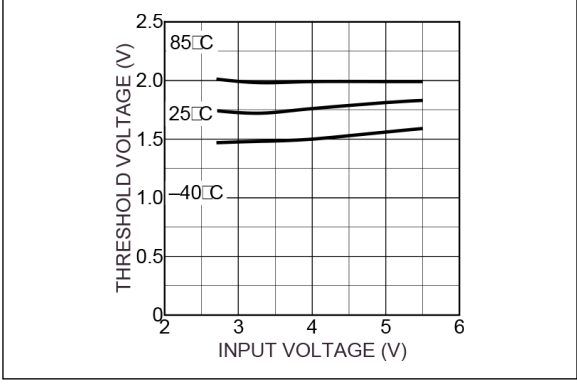


FIGURE 2-6: Control Voltage vs. Input Voltage VEN Rising.

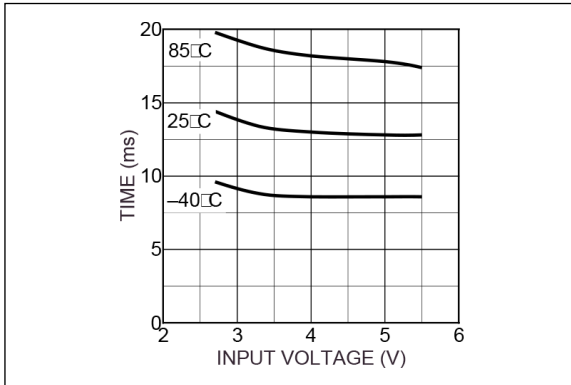


FIGURE 2-7: Flag Delay vs. Input Voltage.

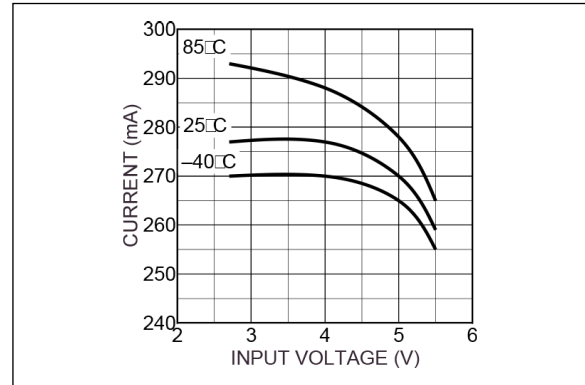


FIGURE 2-9: Current Limit Threshold vs. Input Voltage.

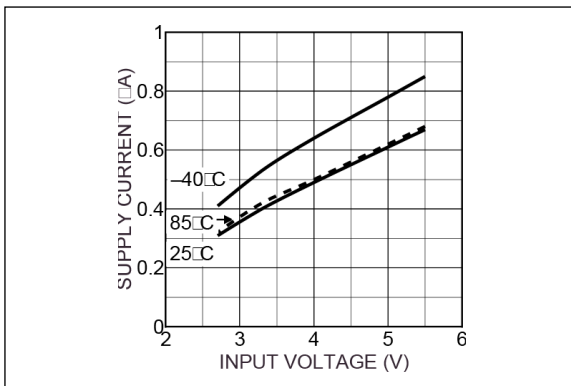


FIGURE 2-8: Supply Off Current vs. Input Voltage.

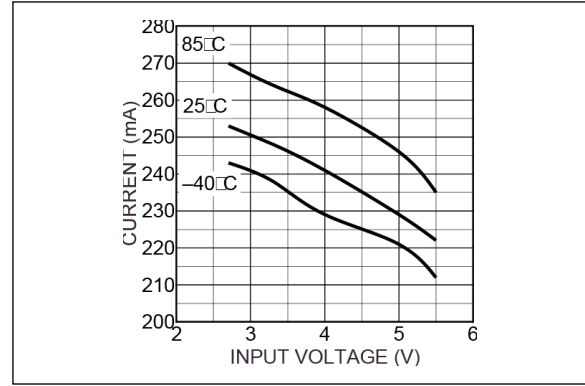


FIGURE 2-10: Short Circuit Current Limit vs. Input Voltage.

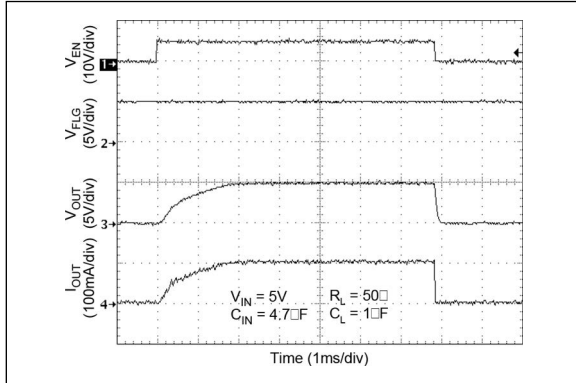


FIGURE 2-11: Turn-On/Turn-Off (MIC2536-1).

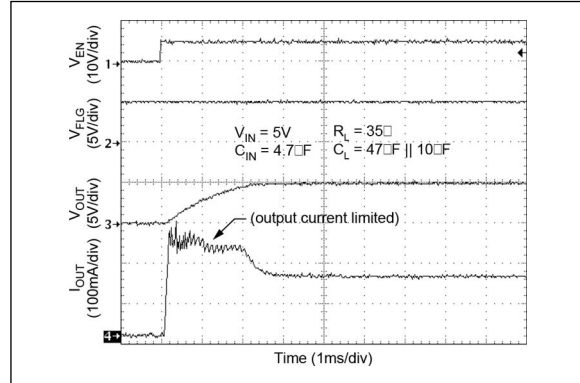


FIGURE 2-14: Turn-On (MIC2536-1).

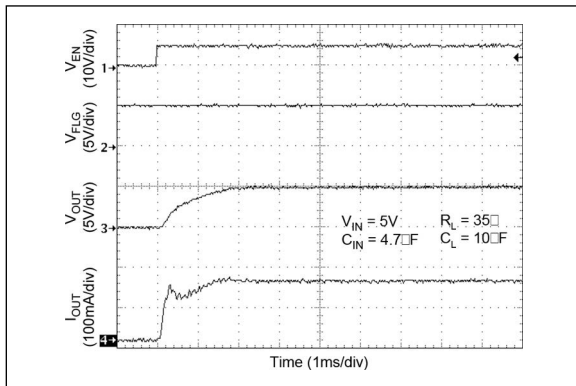


FIGURE 2-12: Turn-On (MIC2536-1).

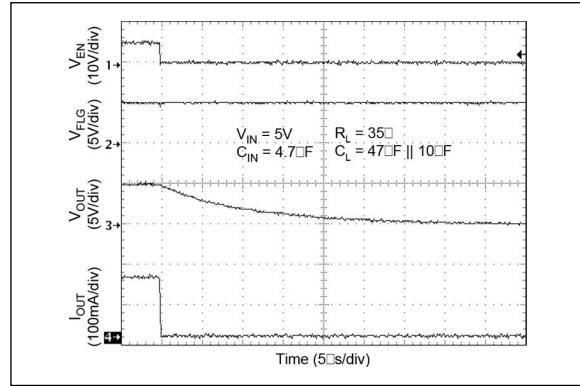


FIGURE 2-15: Turn-Off (MIC2536-1).

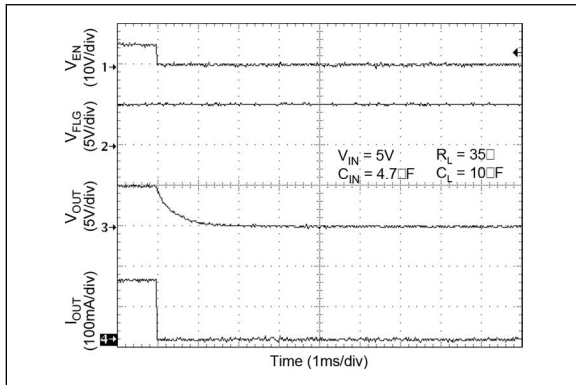


FIGURE 2-13: Turn-Off (MIC2536-1).

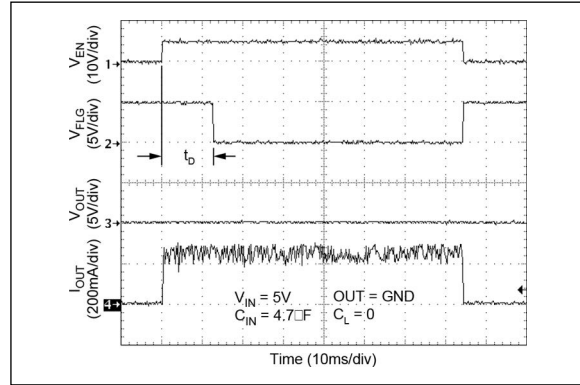


FIGURE 2-16: Enabled into Short Circuit (MIC2536-1).

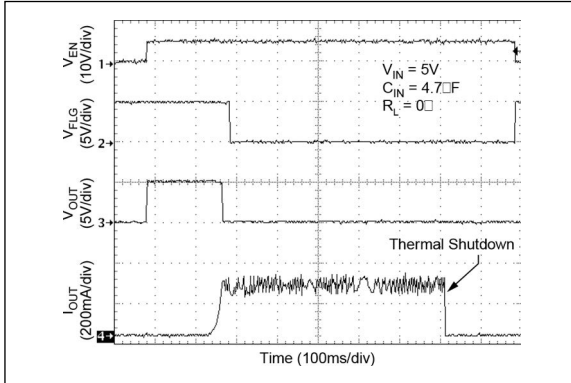


FIGURE 2-17: Ramped into Short Circuit (MIC2536-1).

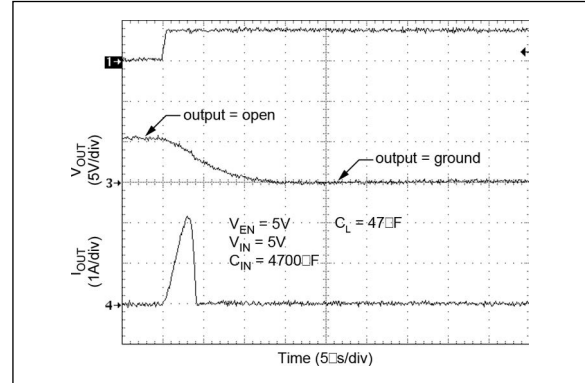


FIGURE 2-19: Current-Loop Response (MIC2536-1).

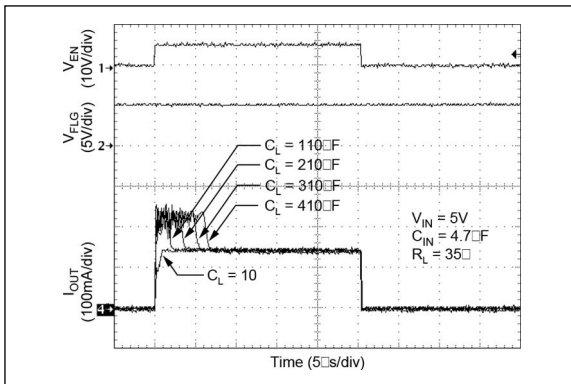


FIGURE 2-18: Inrush Current (MIC2536-1).

3.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in [Table 3-1](#).

TABLE 3-1: PIN FUNCTION TABLE

Pin Number	Pin Name	Description
1	ENA	Enable A (Input): Channel A control input. Active high (–1) or active low (–2) input.
2	FLGA	Flag A: (Output): Channel A open-drain fault flag output. Indicates overcurrent or thermal shutdown conditions. Overcurrent conditions must last longer than t_D in order to assert FLG.
3	FLGB	Flag B (Output): Channel B open-drain fault flag output. Indicates overcurrent or thermal shutdown conditions. Overcurrent conditions must last longer than t_D in order to assert FLG.
4	ENB	Enable B (Input): Channel B control input. Active high (–1) or active low (–2) input.
5	OUTB	Output B: Channel B switch output.
6	GND	Ground.
7	IN	Positive Switch and Logic Supply Input.
8	OUTA	Output A: Channel A switch output.

4.0 FUNCTIONAL DESCRIPTION

The MIC2536-1 and MIC2536-2 are dual high-side switches with active-high and active-low enable inputs, respectively.

Fault conditions turn off or inhibit turn-on of one or more of the output transistors, depending upon the type of fault, and activate the open-drain error flag transistors making them sink current to ground.

4.1 Input and Output

IN (input) is the power supply connection to the logic circuitry and the drain of each output MOSFET. OUTx (output) is the source of each respective MOSFET. In a typical circuit, current flows through the switch from IN to OUTx toward the load. If V_{OUT} is greater than V_{IN} , current will flow from OUT to IN during an on-condition since the MOSFET is bidirectional when enabled.

The output MOSFET and driver circuitry are also designed to allow the MOSFET source to be externally forced to a higher voltage than the drain ($V_{OUTx} > V_{IN}$) when the output is disabled. In this situation, the MIC2536 prevents reverse current flow.

4.2 Thermal Shutdown

Each output MOSFET has its own thermal sensor. If either or both channels reach 135°C, affected channel(s) will be shut down and flag(s) asserted. 10°C of hysteresis prevents the switches from turning on until the die temperature drops to 125°C. Overtemperature detection functions only when at least one switch is enabled.

The MIC2536 will automatically reset its output when the die temperature cools to approximately 125°C. The MIC2536 output and FLG signal will continue to cycle on and off until the device is disabled or the fault is removed.

Depending on PCB layout, package, ambient temperature, etc., it may take several hundred milliseconds from the occurrence of the fault to the output MOSFET being shut off. Delay to reach thermal shutdown will be shortest with a dead short on the output.

4.3 Current-Limit Induced Thermal Shutdown

Internal circuitry increases the output MOSFET on-resistance until the series combination of the MOSFET on-resistance and the load impedance limits output current to approximately 275 mA. The resulting increase in power dissipation may cause the shorted channel to go into thermal shutdown.

In addition, even though individual channels are thermally isolated, it is possible they may shut down when an adjacent channel is shorted. When this is undesirable, thermal shutdown can be avoided by externally responding to the fault and disabling the current-limited channel before the shutdown temperature is reached.

The delay between the flag indication of a current-limit fault and thermal shutdown will vary with ambient temperature, board layout, and load impedance, but is typically several seconds. The USB controller must therefore recognize a fault and disable the appropriate channel within this time.

4.4 Power Dissipation

Power dissipation depends on several factors such as the load, PCB layout, ambient temperature and package type. Equations that can be used to calculate power dissipation and die temperature are found below.

Calculation of power dissipated by each channel can be accomplished by the following equation:

EQUATION 4-1:

$$P_D = R_{DS(ON)} \times (I_{OUT})^2$$

Total power dissipation of the device will be the summation of PD for both channels. To relate this to junction temperature, the following equation can be used:

EQUATION 4-2:

$$T_J = P_D \times \theta_{JA} + T_A$$

Where:

T_J = Junction temperature

T_A = Ambient temperature

θ_{JA} = Thermal resistance of the package

4.5 Current Sensing and Limiting

The current-limit threshold is preset internally. The preset level prevents damage to the output MOSFET and external load but allows a minimum current of 150 mA through the output MOSFET of each channel.

The current-limit circuit senses a portion of the output FET switch current. The current sense resistor shown in the block diagram is virtual and has no voltage drop. The reaction to an overcurrent condition varies with the following three scenarios:

4.5.1 SWITCH ENABLED INTO SHORT CIRCUIT

If a switch is enabled into a heavy load or short circuit, the switch immediately goes into a constant-current mode, reducing the output voltage. The FLG is asserted indicating an overcurrent condition.

4.5.2 SHORT CIRCUIT APPLIED TO OUTPUT

When a heavy load or short circuit is applied to an enabled switch, a large transient current may flow until the current-limit circuitry responds. Once this occurs, the device limits current to less than the maximum short-circuit current-limit specification.

4.5.3 CURRENT-LIMIT RESPONSE RAMPED LOAD

The MIC2536 current-limit profile exhibits a small foldback effect of approximately 100 mA. Once this current-limit threshold is exceeded the device enters constant-current mode.

This constant current is specified as the short-circuit current-limit in the "Electrical Characteristics" table. It is important to note that the MIC2536 will deliver load current up to the current-limit threshold before entering current-limited operation.

4.6 Fault Flag

FLGx is an open-drain N-channel MOSFET output. Fault flags are active (low) for current-limit or thermal shutdown. In the case where an overcurrent condition occurs, FLG will be asserted only after the flag response delay time, t_D has elapsed.

This ensures that FLG is asserted only upon valid overcurrent conditions and that erroneous error reporting is eliminated. False overcurrent conditions can occur during hot-plug events when a highly capacitive load is connected and causes a high transient inrush current that exceeds the current-limit threshold. The flag response delay time is typically 12 ms.

MIC2536

5.0 APPLICATION INFORMATION

5.1 Supply Filtering

A 0.1 μF to 1 μF bypass capacitor from IN to GND, located at the device, is strongly recommended to control supply transients.

Without a bypass capacitor, an output short may cause sufficient ringing on the input (from supply lead inductance) to damage internal control circuitry.

Input or output transients must not exceed the absolute maximum supply voltage ($V_{\text{IN(MAX)}} = 6\text{V}$) even for a short duration.

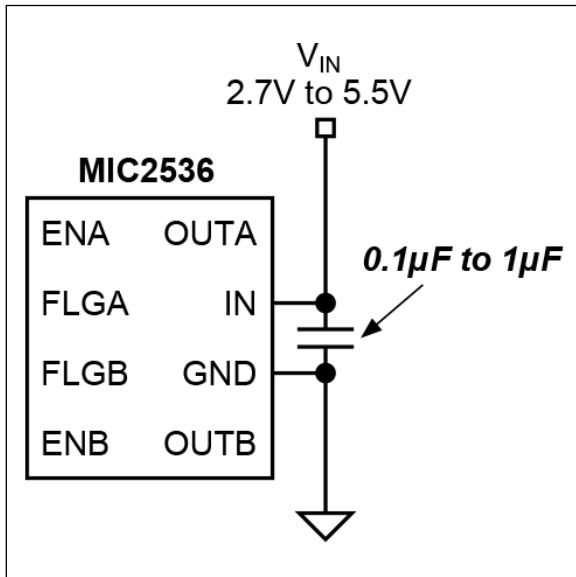


FIGURE 5-1: Supply Bypassing.

5.2 Enable Input

EN must be driven logic high or logic low for a clearly defined input. Floating the input may cause unpredictable operation. EN should not be allowed to go negative with respect to GND.

5.2.1 PRINTED CIRCUIT BOARD HOT-PLUG

The MIC2536 is an ideal inrush current-limiter for hot-plug applications. Due to the integrated charge pump, the MIC2536 presents a high impedance when off and slowly becomes a low impedance as it turns on. This “soft-start” feature effectively isolates power supplies from highly capacitive loads by reducing inrush current. Figure 5-2 shows how the MIC2536 may be used in a hot-plug card application.

5.3 Overcurrent Transients

The MIC2536 incorporates an internal circuit designed to prevent FLG from being asserted due to transient inrush current. Overcurrent events <12 ms (typ.) will not assert FLG.

In case of large capacitive loads (i.e., >430 μF), the length of the transient due to inrush current may exceed the delay provided by the integrated filter.

Since this inrush current exceeds the current-limit delay specification, FLG will be asserted during this time. To prevent the logic controller from responding to FLG being asserted, an external RC filter, as shown in Figure 5-3, can be used to filter out transient FLG assertion. The value of the RC time constant should be selected to match the length of the transient, minus flag t_D .

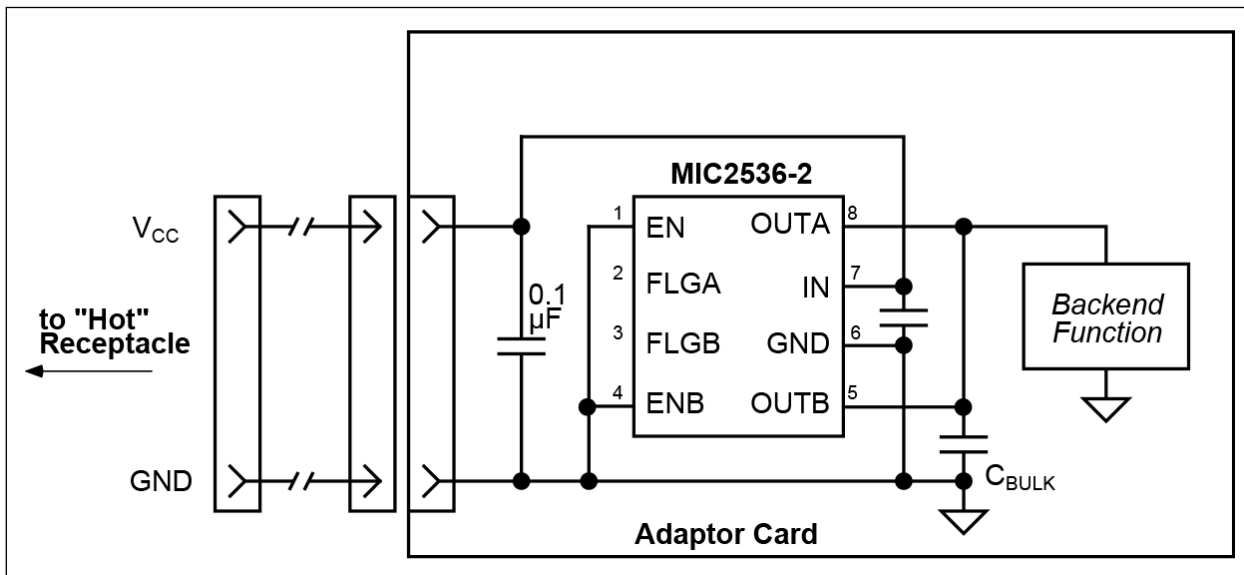


FIGURE 5-2: Hot-Plug Card Application.

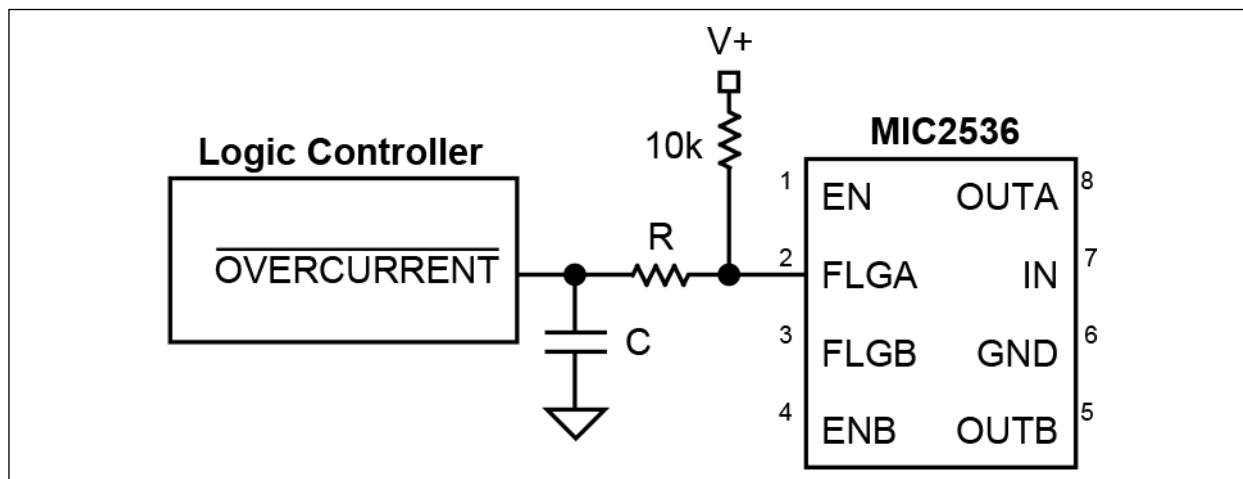


FIGURE 5-3: Transient Filter.

5.4 Universal Serial Bus (USB) Power Distribution Applications

The MIC2536 is ideally suited for USB (Universal Serial Bus) power distribution applications. For Bus-Powered hubs, USB requires that each downstream port be switched on or off under control by the host. Up to four downstream ports each capable of supplying 100 mA at 4.4V minimum are allowed. In addition, to reduce voltage droop on the upstream bus the hub must consume only 100 mA max at start-up until it enumerates with the host prior to requesting more power. The same requirements apply for bus-powered peripherals that have no downstream ports. Figure 5-4 shows a two-port bus-powered hub.

5.5 Bus-Powered Hub Port Switching

The USB Specification requires that bus-powered hubs implement port switching on either a ganged or individual basis. The specific implementation must be reported via the Hub Descriptor Status Register. Individual port switching has advantages in that a fault on one port will not prevent the other ports from operating correctly. In addition, a soft-start circuit must be included in order to reduce inrush currents when the switch is enabled. To meet this requirement, the MIC2536 has been designed to slowly ramp its output.

5.6 Suspend Current

Universal Serial Bus Specification places a maximum suspend current requirement of 500µA on devices. For hubs, Universal Serial Bus Specification Revision 1.1 clarifies this issue. Revision 1.1, section 7.2.3, stipulates that the maximum suspend current for a configured hub is 2.5 mA. This number is derived by allocating 500 µA for up to four downstream ports plus 500 µA for the hub's internal functions. A nonconfigured hub is considered a low-power device and may not consume more than 500 µA.

In a nonconfigured state all downstream devices will be switched off. In most cases, a nonconfigured hub is not a practical state for the system. Therefore, the 2.5 mA specification is the applicable target specification for the suspend state. In a bus-powered hub with less than 4 ports, the hub may use the additional current for internal functions.

The 500 µA worst case suspend current must be further divided among the data port termination resistors and internal functions. The termination resistors will consume $3.6V \div (16.5 K\Omega - 5\%) = 230 \mu A$. This leaves only 270 µA for internal functions. Assuming 100 µA as the maximum USB controller suspend current, 170 µA remains for the rest of the system. The MIC2536 will consume 100 µA maximum, leaving a margin of 70 µA.

5.7 USB Voltage Regulation

USB specifications require a minimum downstream voltage supply of 4.40V from a bus-powered hub port (See Application Note 17 for details). The USB specification allows for a 100 mV drop across the hub, leaving 250 mV for PCB, upstream cable, and connector resistance. Therefore, the on-resistance of the switch for each port, not including PCB resistance, must be $<100 mV \div 100 mA = 1\Omega$. The MIC2536 has a maximum on-resistance of 700 mΩ, which easily satisfies this requirement.

5.8 Overcurrent Indication

The USB Specification does not require bus-powered hubs to report overcurrent conditions to the host, since the hub is already current-limited at the upstream port. However, if it is desired to report overcurrent, the Hub Descriptor Status Register must be programmed to indicate this. The MIC2536 provides a flag output for this application.

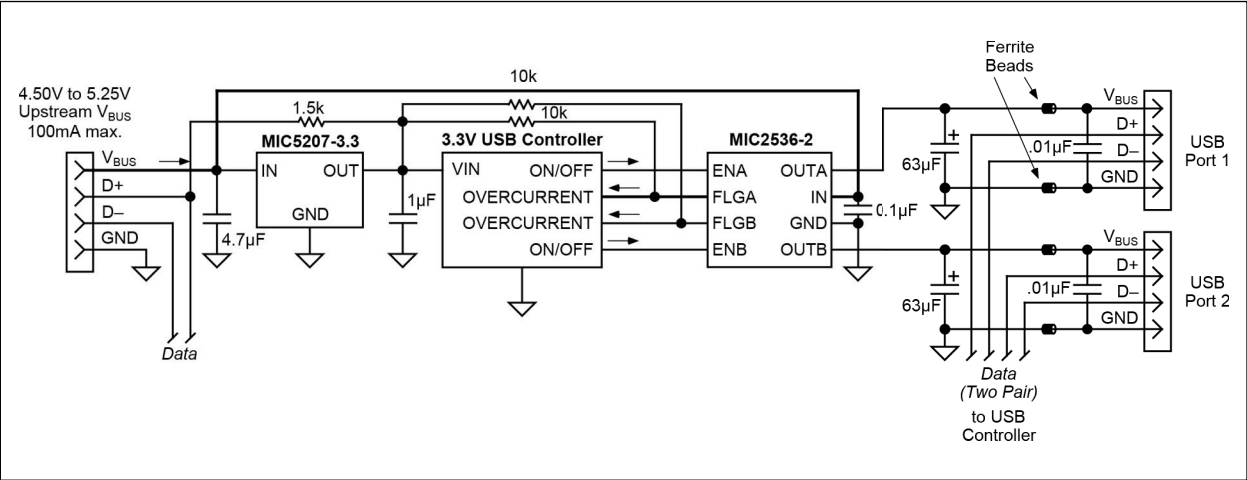
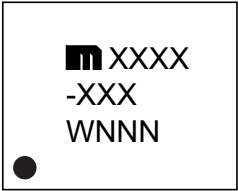
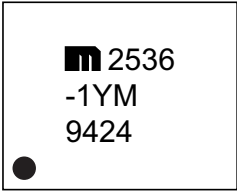
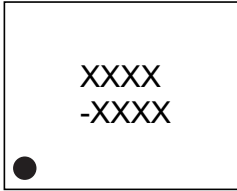
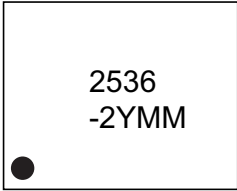



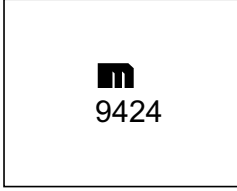


FIGURE 5-4: USB Two-Port Bus-Powered Hub.

6.0 PACKAGING INFORMATION

6.1 Package Marking Information

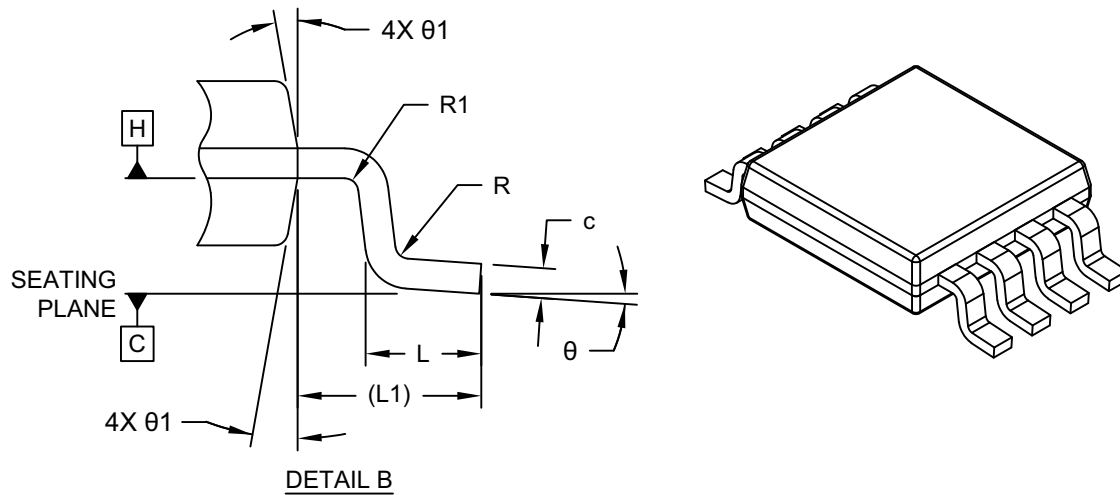
8-Lead SOIC* (front)	Example	8-Lead MSOP* (front)	Example
			
8-Lead SOIC* (back)	Example	8-Lead MSOP* (back)	Example
			

Legend:	<p>XX...X Product code or customer-specific information</p> <p>Y Year code (last digit of calendar year)</p> <p>YY Year code (last 2 digits of calendar year)</p> <p>WW Week code (week of January 1 is week '01')</p> <p>NNN Alphanumeric traceability code</p> <p>(e3) Pb-free JEDEC® designator for Matte Tin (Sn)</p> <p>* This package is Pb-free. The Pb-free JEDEC designator (e3) can be found on the outer packaging for this package.</p> <p>•, ▲, ▼ Pin one index is identified by a dot, delta up, or delta down (triangle mark).</p>
Note:	<p>In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information. Package may or may not include the corporate logo.</p> <p>Underbar (_) and/or Overbar (¯) symbol may not be to scale.</p>

Note: If the full seven-character YYWWNNN code cannot fit on the package, the following truncated codes are used based on the available marking space: 6 Characters = YWWNNN; 5 Characters = WWNNN; 4 Characters = WNNN; 3 Characters = NNN; 2 Characters = NN; 1 Character = N.

8-Lead 3.0 mm × 3.0 mm MSOP [DMA] Package Outline and Recommended Land Pattern

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Number of Terminals	N		8		
Pitch	e		0.65 BSC		
Overall Height	A		0.94	1.02	1.10
Standoff	A1		0.00	—	0.15
Molded Package Thickness	A2		0.75	0.85	0.95
Overall Length	D		3.00 BSC		
Overall Width	E		4.90 BSC		
Molded Package Width	E1		3.00 BSC		
Terminal Width	b		0.25	0.30	0.40
Terminal Thickness	c		0.13	0.15	0.23
Terminal Length	L		0.45	0.55	0.70
Footprint	L1		0.95 REF		
Lead Bend Radius	R		0.07	—	—
Lead Bend Radius	R1		0.07	—	—
Foot Angle	θ		0°	—	8°
Mold Draft Angle	θ1		5°	—	15°

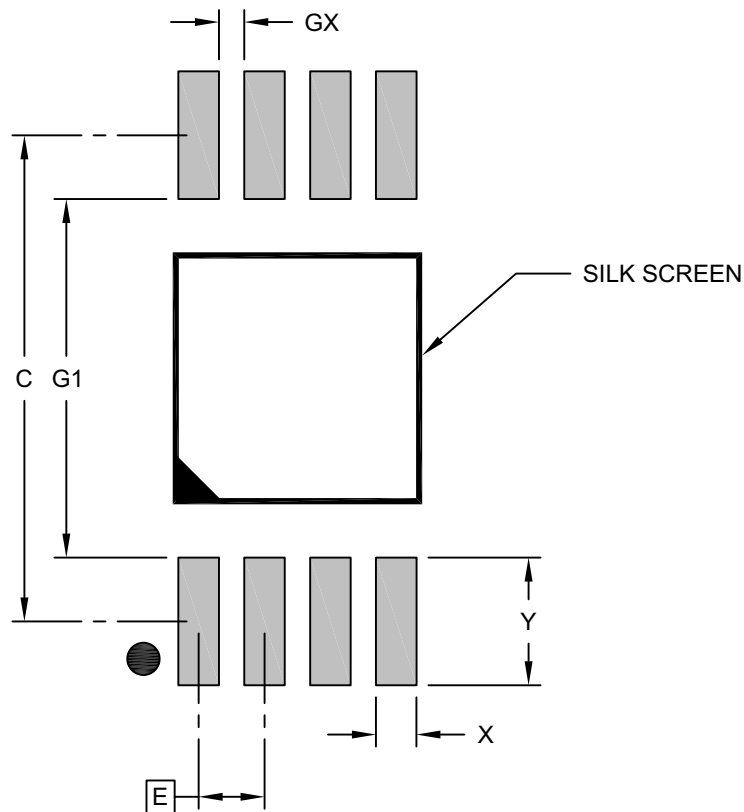
Notes:

- Pin 1 visual index feature may vary, but must be located within the hatched area.
- Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm per side.
- Dimensioning and tolerancing per ASME Y14.5M
BSC: Basic Dimension. Theoretically exact value shown without tolerances.
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-1082 Rev A Sheet 2 of 2

8-Lead 3.0 mm × 3.0 mm MSOP [DMA] Package Outline and Recommended Land Pattern

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E	0.65 BSC		
Contact Pad Spacing	C		4.80	
Contact Pad Width (X8)	X			0.40
Contact Pad Length (X8)	Y			1.26
Contact Pad to Contact Pad (X4)	G1	3.54		
Contact Pad to Contact Pad (X6)	GX	0.25		

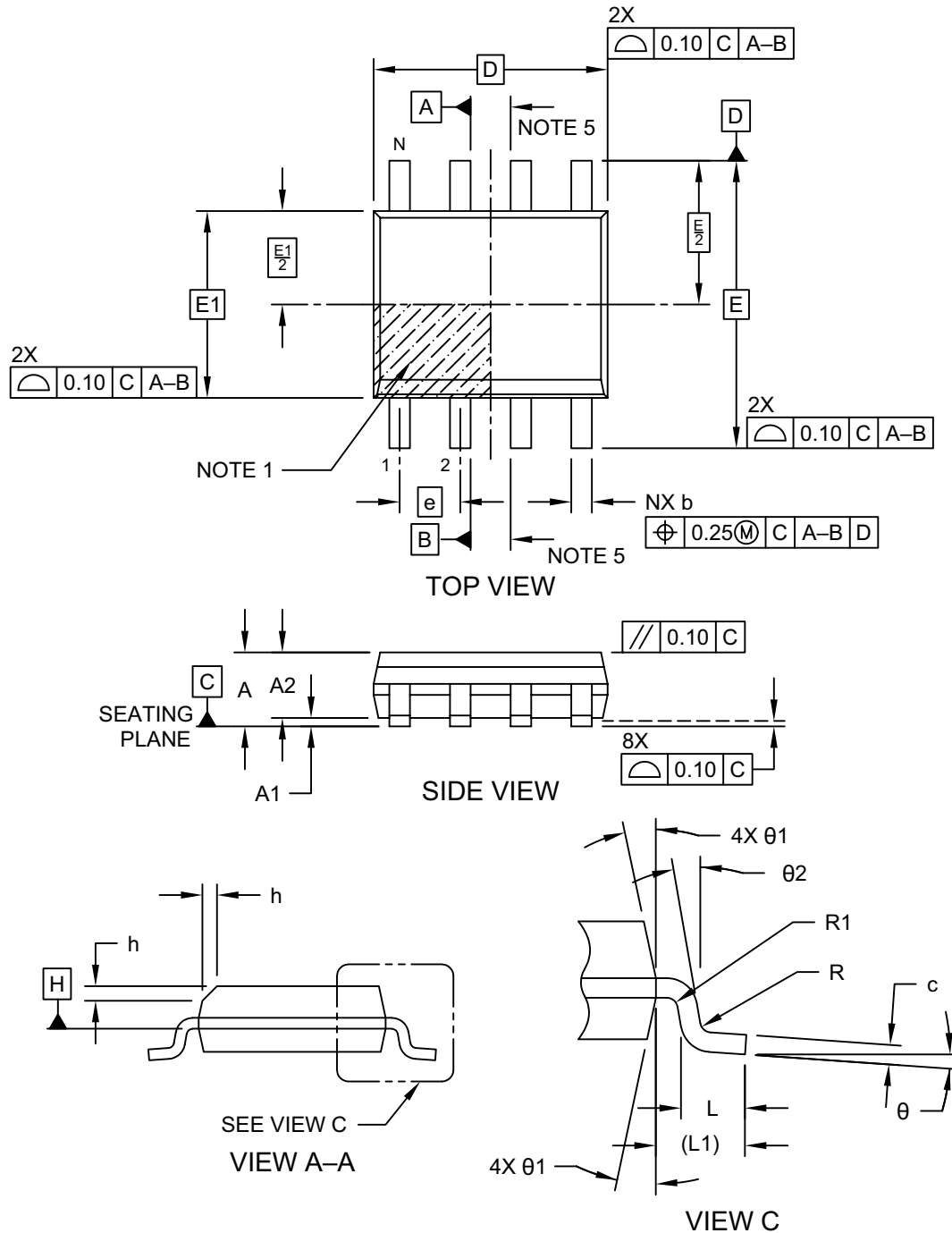
Notes:

1. Dimensioning and tolerancing per ASME Y14.5M
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-3082 Rev A

8-Lead 3.9 mm SOIC [3BX] Package Outline and Recommended Land Pattern

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>

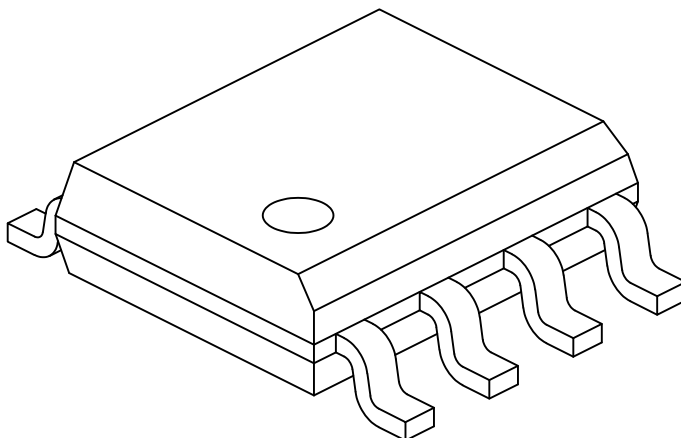


Microchip Technology Drawing No. C04-057-3BX Rev K Sheet 1 of 2

MIC2536

8-Lead 3.9 mm SOIC [3BX] Package Outline and Recommended Land Pattern

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension	Limits	MIN	NOM	MAX
Number of Pins	N	8		
Pitch	e	1.27 BSC		
Overall Height	A	–	–	1.75
Molded Package Thickness	A2	1.25	–	–
Standoff §	A1	0.10	–	0.25
Overall Width	E	6.00 BSC		
Molded Package Width	E1	3.90 BSC		
Overall Length	D	4.90 BSC		
Chamfer (Optional)	h	0.25	–	0.50
Foot Length	L	0.40	–	1.27
Footprint	L1	1.04 REF		
Lead Thickness	c	0.17	–	0.25
Lead Width	b	0.31	–	0.51
Lead Bend Radius	R	0.07	–	–
Lead Bend Radius	R1	0.07	–	–
Foot Angle	θ	0°	–	8°
Mold Draft Angle	θ1	5°	–	15°
Lead Angle	θ2	0°	–	–

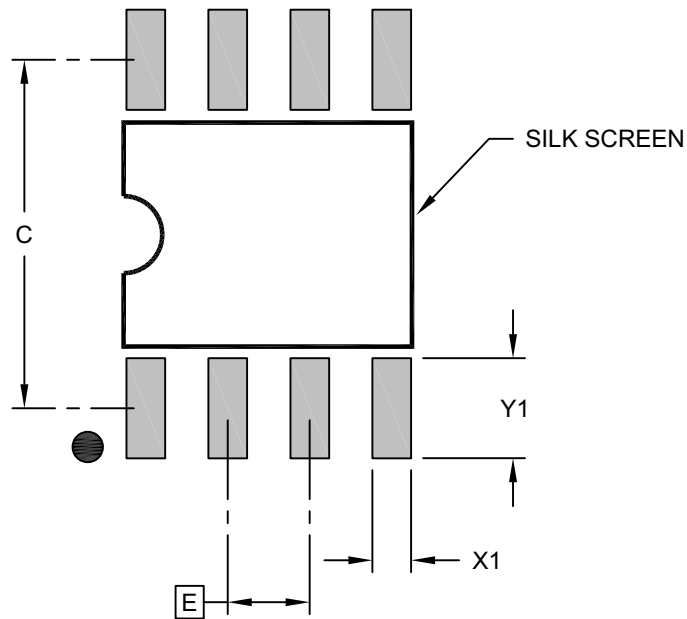
Notes:

- Pin 1 visual index feature may vary, but must be located within the hatched area.
- § Significant Characteristic
- Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm per side.
- Dimensioning and tolerancing per ASME Y14.5M
BSC: Basic Dimension. Theoretically exact value shown without tolerances.
REF: Reference Dimension, usually without tolerance, for information purposes only.
- Datums A & B to be determined at Datum H.

Microchip Technology Drawing No. C04-057-3BX Rev K Sheet 2 of 2

8-Lead 3.9 mm SOIC [3BX] Package Outline and Recommended Land Pattern

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

		Units	MILLIMETERS		
Dimension Limits			MIN	NOM	MAX
Contact Pitch	E			1.27 BSC	
Contact Pad Spacing	C			5.40	
Contact Pad Width (X8)	X1				0.60
Contact Pad Length (X8)	Y1				1.55

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-2057-3BX Rev K

MIC2536

NOTES:

APPENDIX A: REVISION HISTORY

Revision A (November 2023)

- Converted Micrel document MIC2536 to Microchip data sheet DS20006795A.
- Minor text changes throughout.

MIC2536

NOTES:

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact your local Microchip representative or sales office.

<u>PART No.</u>	<u>-X</u>	<u>X</u>	<u>XX</u>	<u>-XX</u>	Examples:
Device	Enable Input	Temperature Range	Package	Media Type	
Device:	MIC2536:	Dual USB Power Distribution Switch			a) MIC2536-1YM: MIC2536, Active-High Enable Input, -40°C to +85°C Temp. Range, 8-Lead SOIC, 95/Tube
Enable Input:	-1 = Active-High -2 = Active-Low				b) MIC2536-2YMM: MIC2536, Active-Low Enable Input, -40°C to +85°C Temp. Range, 8-Lead MSOP, 95/Tube
Temperature Range:	Y = -40°C to +85°C				c) MIC2536-1YMM-TR: MIC2536, Active-High Enable Input, -40°C to +85°C Temp. Range, 8-Lead MSOP, 2500/Reel
Package:	M = 8-Lead SOIC MM = 8-Lead MSOP				d) MIC2536-2YM-TR: MIC2536, Active-Low Enable Input, -40°C to +85°C Temp. Range, 8-Lead SOIC, 2500/Reel
Media Type:	<blank>= 95/Tube -TR = 2500/Reel				Note 1: Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip Sales Office for package availability with the Tape and Reel option.

MIC2536

NOTES:

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