EMC2103

RPM-Based Fan Controller with Hardware Thermal Shutdown

PRODUCT FEATURES

Data Brief

General Description

The EMC2103 is an SMBus compliant fan controller with up to up to 3 external and 1 internal temperature channels. The fan driver can be operated using two methods each with two modes. The methods include an RPM based Fan Speed Control Algorithm and a direct PWM drive setting. The modes include manually programming the desired settings or using the internal programmable temperature look-up table to select the desired setting based on measured temperature.

The temperature monitors offer 1°C accuracy (for external diodes) with sophisticated features to reduce errors introduced by series resistance and beta variation of substrate thermal diode transistors commonly found in processors.

The EMC2103 also includes a hardware programmable temperature limit and dedicated system shutdown output for thermal protection of critical circuitry.

Applications

- Notebook Computers
- Projectors
- Graphics Cards
- Industrial and Networking Equipment

Features

- Programmable Fan Control circuit
  - 4-wire fan compatible
  - High and low frequency PWM
- RPM based fan control algorithm
  - 2.5% accuracy from 500RPM to 16k RPM
  - Detects fan aging and variation
- Temperature Look-Up Table
  - Allows programmed fan response to temperature
  - Controls fan speed or PWM drive setting
  - Allows externally set temperature data to drive fan
  - Supports DTS data from CPU
- Up to Three External Temperature Channels (EMC2103-2 only)
  - Supports 45nm, 60nm, and 90nm CPU diodes
  - Automatically detects and supports CPUs requiring BJT or Transistor models
  - Resistance error correction
  - Supports discrete transistors (i.e. 2N3904)
  - 1°C accurate (60°C to 125°C)
  - 0.125°C resolution
- Hardware Programmable Thermal Shutdown Temperature
  - Cannot be altered by software
  - 65°C to 127°C Range
- Programmable High and Low Limits for all channels
- Internal Temperature Monitor
  - 2°C accuracy
  - 0.125°C resolution
- 3.3V Supply Voltage
- SMBus 2.0 Compliant
  - SMBus Alert compatible
- Two dedicated GPIOs (EMC2103-2 and EMC2103-4 only)
- Available in 12-pin, QFN Lead-Free RoHS Compliant Package (EMC2103-1 and EMC2103-3) or 16-pin, QFN Lead-Free RoHS Compliant Package (EMC2103-2 and EMC2103-4)

ORDER NUMBERS:

ORDERING NUMBER	PACKAGE	FEATURES
EMC2103-1-KP-TR	12-pin, QFN Lead-Free, ROHS Compliant	One external diode, RPM based Fan Speed Control Algorithm, High Frequency PWM driver, HW Thermal / Critical shutdown, EEPROM Load disabled
EMC2103-2-AP-TR	16-pin, QFN Lead-Free, ROHS Compliant	Up to three external diodes, RPM based Fan Speed Control algorithm, High Frequency PWM driver, HW Thermal / Critical shutdown, 2 GPIOs, EEPROM Load disabled
EMC2103-4-AP-TR	16-pin, QFN Lead-Free, ROHS Compliant	Up to three external diodes, RPM based Fan Speed Control algorithm, High Frequency PWM driver, HW Thermal / Critical shutdown, 2 GPIOs, EEPROM Load enabled

REEL SIZE IS 4,000 PIECES

This product meets the halogen maximum concentration values per IEC61249-2-21

For RoHS compliance and environmental information, please visit www.smsc.com/rohs

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Block Diagram

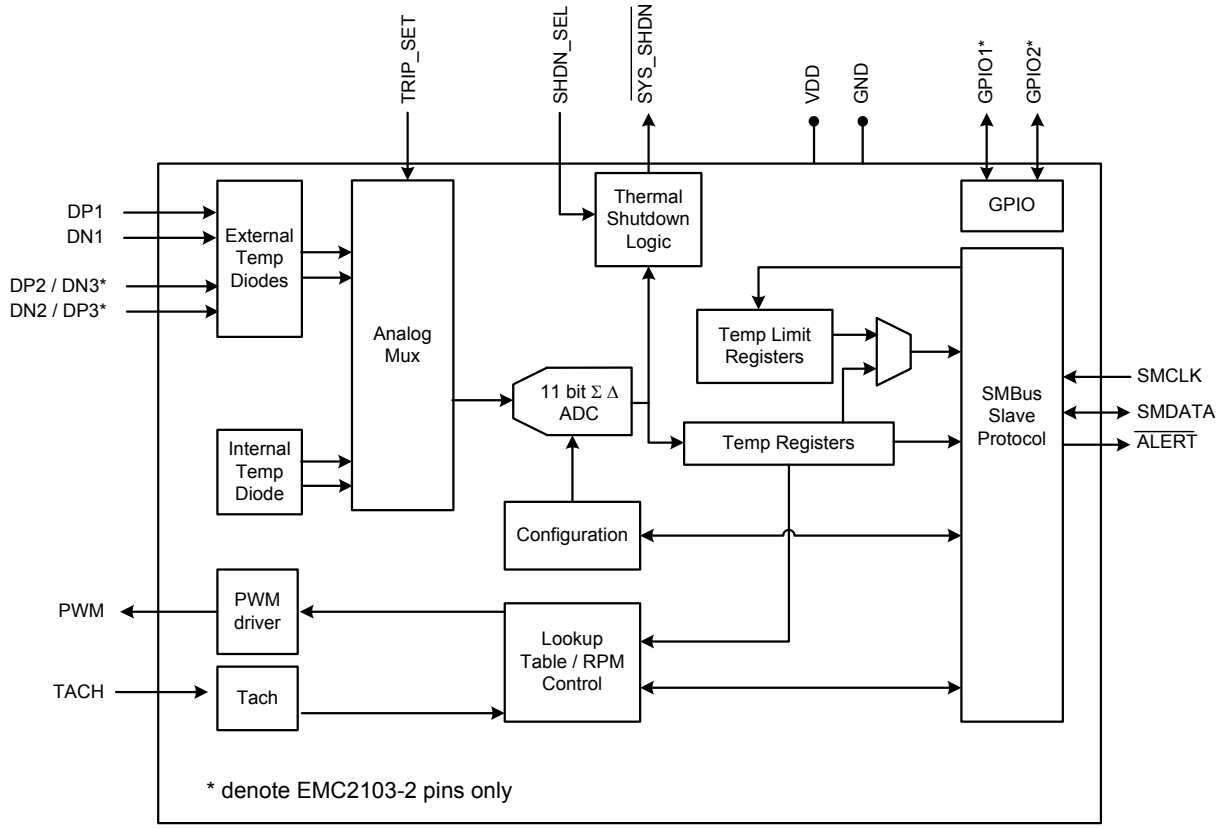


Figure 1 EMC2103 Block Diagram

Package Outline

EMC2103-1 Package Information

COMMON DIMENSIONS					
SYMBOL	MIN	NOM	MAX	NOTE	REMARK
A	0.80	0.85	0.90	-	OVERALL PACKAGE HEIGHT
A1	0	0.02	0.05	-	STANDOFF
A3		0.20 REF		-	LEAD-FRAME THICKNESS
D/E	3.90	4.00	4.10	-	X/Y BODY SIZE
D2/E2	2.00	2.10	2.20	2	X/Y EXPOSED PAD SIZE
L	0.45	0.50	0.55	-	TERMINAL LENGTH
b	0.25	0.30	0.35	2	TERMINAL WIDTH
K	0.20	-	-	-	TERMINAL TO PAD DISTANCE
e		0.80 BSC		-	TERMINAL PITCH

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. POSITION TOLERANCE OF EACH TERMINAL AND EXPOSED PAD IS ± 0.05mm AT MAXIMUM MATERIAL CONDITION. DIMENSIONS "b" APPLIES TO PLATED TERMINALS AND IT IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM THE TERMINAL TIP.
3. DETAILS OF TERMINAL #1 IDENTIFIER ARE OPTIONAL BUT MUST BE LOCATED WITHIN THE AREA INDICATED.

Figure 2 Preliminary 12-Pin QFN 4mm x 4mm Package Dimensions

PRODUCT PREVIEW

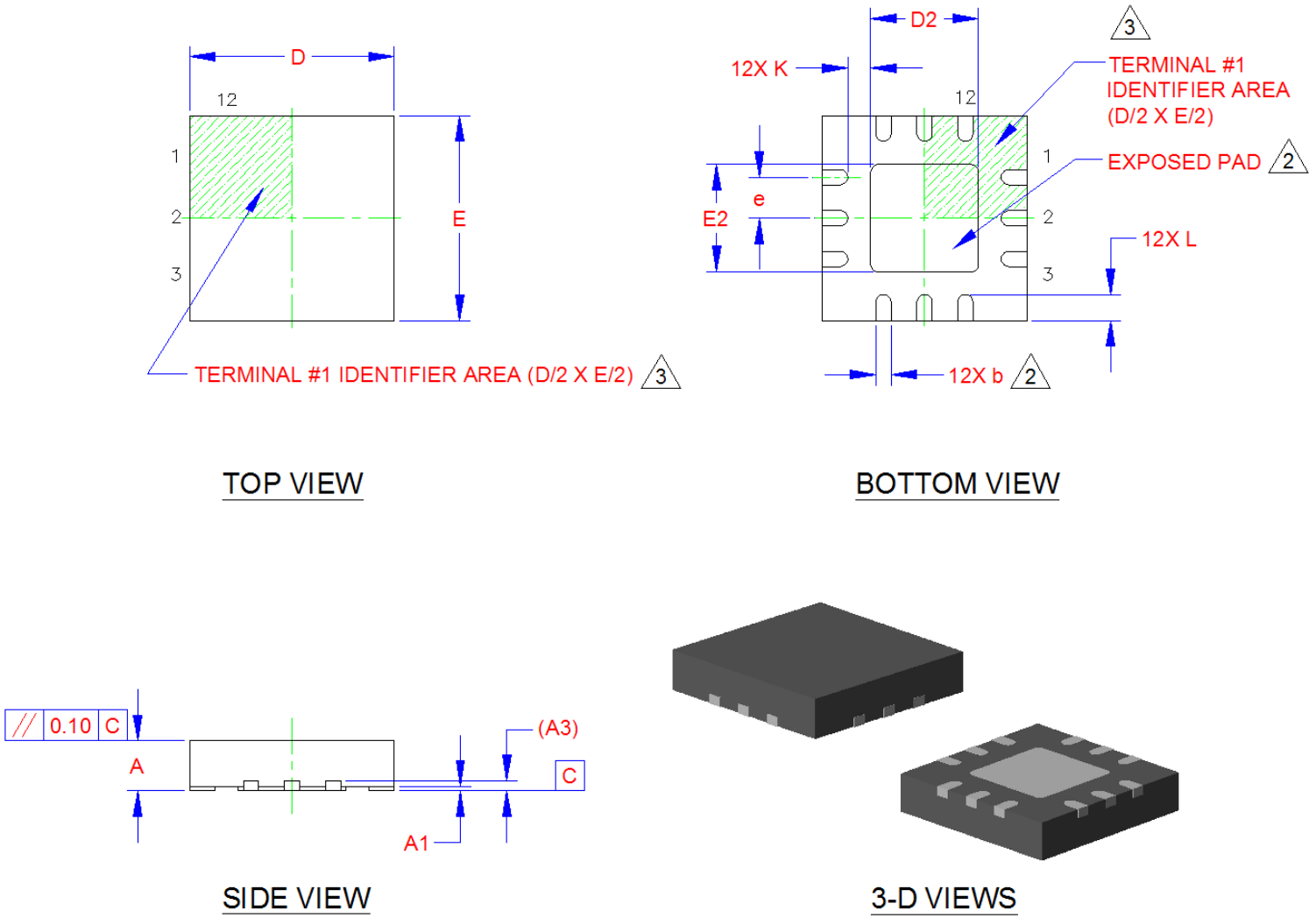
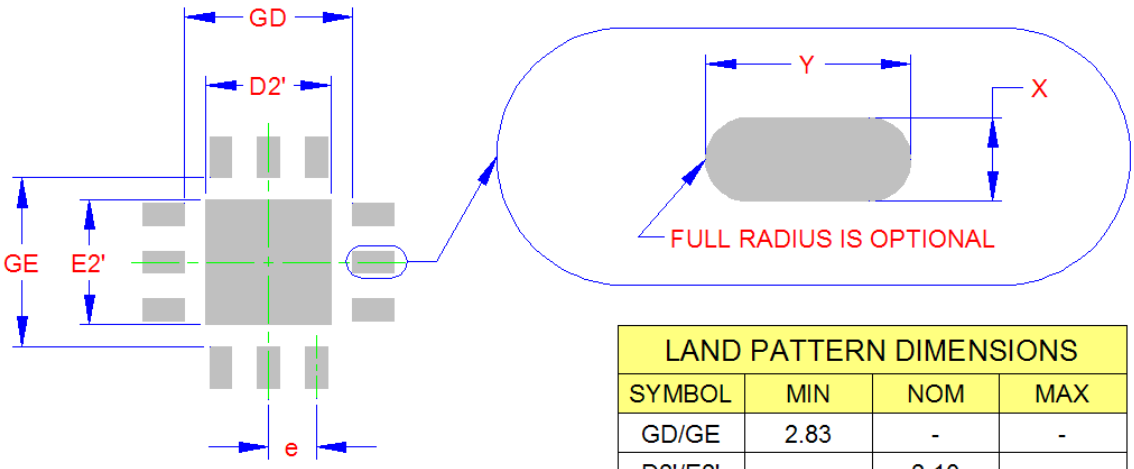


Figure 3 Preliminary 12-Pin QFN 4mm x 4mm Package Drawing



LAND PATTERN DIMENSIONS			
SYMBOL	MIN	NOM	MAX
GD/GE	2.83	-	-
D2'/E2'	-	2.10	-
X	-	-	0.37
Y	-	-	0.69
e		0.80	

RECOMMENDED PCB LAND PATTERN

Figure 4 Recommended PCB Footprint 12-Pin QFN 4mm x 4mm

EMC2103-2 Package Information

COMMON DIMENSIONS					
SYMBOL	MIN	NOM	MAX	NOTE	REMARK
A	0.80	0.85	0.90	-	OVERALL PACKAGE HEIGHT
A1	0	0.02	0.05	-	STANDOFF
A3		0.20 REF		-	LEAD-FRAME THICKNESS
D/E	3.90	4.00	4.10	-	X/Y BODY SIZE
D2/E2	2.00	2.10	2.20	2	X/Y EXPOSED PAD SIZE
L	0.45	0.50	0.55	-	TERMINAL LENGTH
b	0.25	0.30	0.35	2	TERMINAL WIDTH
K	0.20	-	-	-	TERMINAL TO PAD DISTANCE
e		0.65 BSC		-	TERMINAL PITCH

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. POSITION TOLERANCE OF EACH TERMINAL AND EXPOSED PAD IS ± 0.05mm AT MAXIMUM MATERIAL CONDITION. DIMENSIONS "b" APPLIES TO PLATED TERMINALS AND IT IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM THE TERMINAL TIP.
3. DETAILS OF TERMINAL #1 IDENTIFIER ARE OPTIONAL BUT MUST BE LOCATED WITHIN THE AREA INDICATED.

Figure 5 Preliminary 16-Pin QFN 4mm x 4mm Package Dimensions

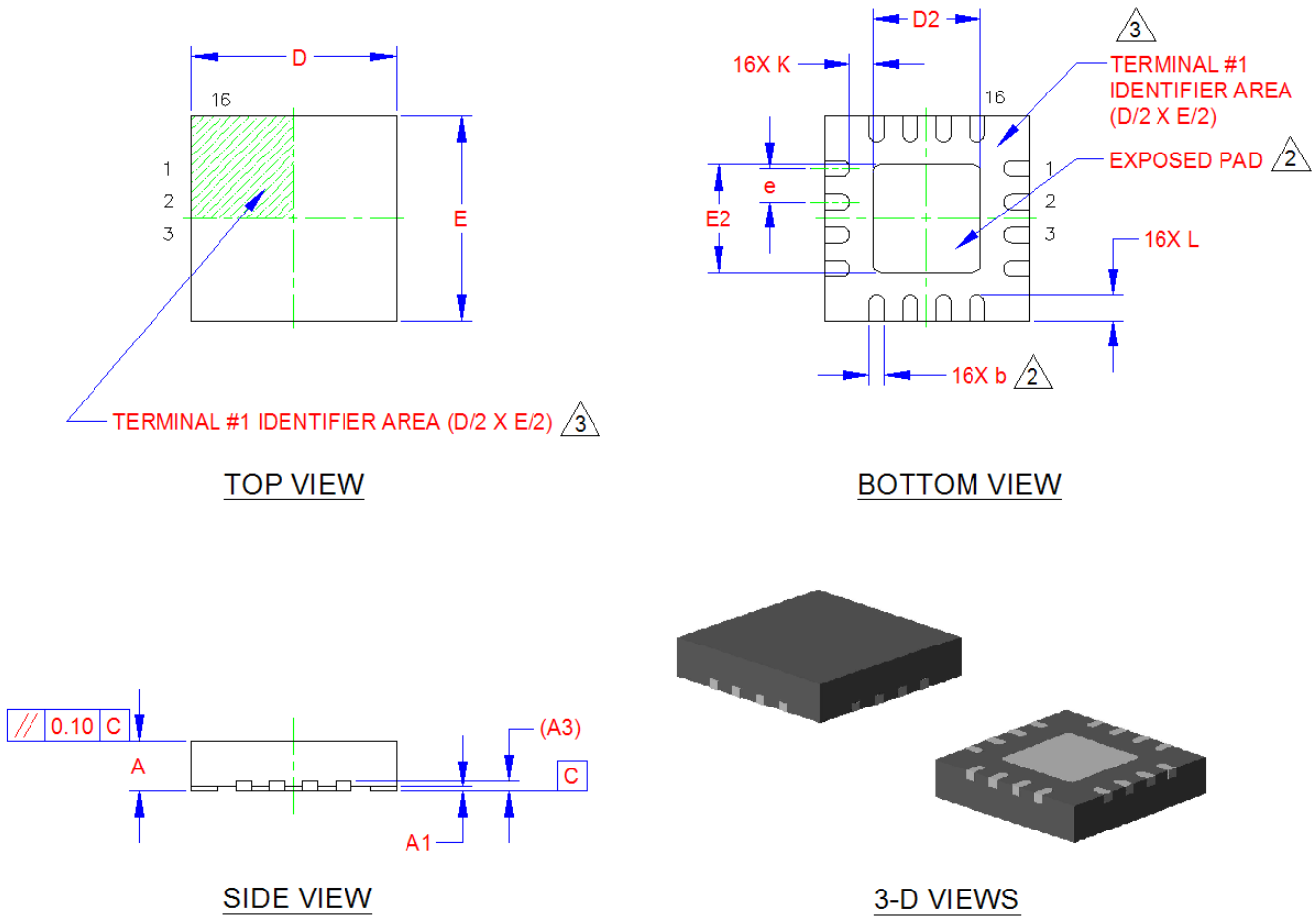
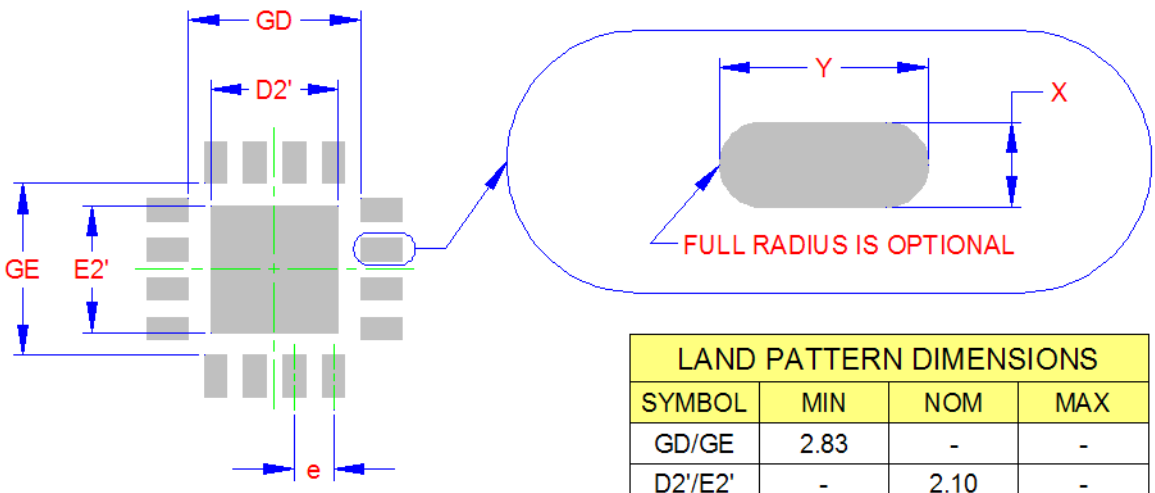


Figure 6 Preliminary 16-Pin QFN 4mm x 4mm Package Drawing



LAND PATTERN DIMENSIONS			
SYMBOL	MIN	NOM	MAX
GD/GE	2.83	-	-
D2'/E2'	-	2.10	-
X	-	-	0.37
Y	-	-	0.69
e		0.65	

RECOMMENDED PCB LAND PATTERN

Figure 7 Recommended PCB Footprint 16-Pin QFN 4mm x 4mm