EMC1704

High-Side Current-Sense and Multiple 1°C Temperature Monitor

PRODUCT FEATURES

Data Brief

General Description

The EMC1704 is a combination high-side current sensing device with precision temperature measurement. It measures the voltage developed across an external sense resistor to represent the high-side current of a battery or voltage regulator. It also measures the bus voltage and uses these measured values to present a proportional power calculation. The EMC1704 contains additional bi-directional peak detection circuitry to flag instantaneous current spikes with programmable time duration and magnitude threshold. Finally, the EMC1704 includes up to three (3) external diode channels and an internal temperature sensor for temperature measurement.

The temperature measurement includes advanced features such as Resistance Error Correction (REC), Beta Compensation (to support CPU diodes requiring the BJT/transistor model including 45nm and 65nm processors), and automatic diode type detection.

Both current sensing and temperature monitoring include two tiers of protection: one that can be masked and causes the ALERT pin to be asserted, and the other that cannot be masked and causes the THERM pin to be asserted.

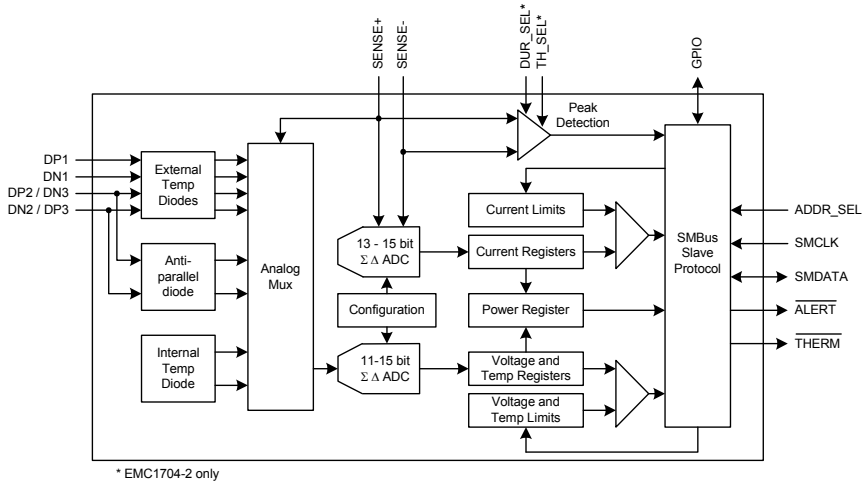
Applications

- Notebook and Desktop Computers
- Industrial
- Power Management Systems
- Embedded Applications

Features

- High-side current sensor
  - Bi-directional current measurement
  - Measures bus voltage and indicates power ratio
  - 1% current measurement accuracy
  - Integrated over 82ms to 2.6sec with 11-bit resolution
  - 3V to 24V voltage bus voltage range
- Independent hardware set instantaneous current peak detector (EMC1704-2 only)
  - Software controls to program time duration and magnitude threshold
- Power supply options
  - Bus or separately powered for low voltage operation
- Wide temperature operating range: -40°C to +85°C
- Up to three external temperature monitors
  - 1°C accuracy (20°C < T_{DIODE} < 110°C) with 0.125°C resolution
  - Ideality factor setting
  - Support for 45nm and 65nm CPU diodes requiring the BJT/transistor model w/ beta compensation
  - Determines external diode type and optimal settings
  - Resistance Error Correction
  - Anti-parallel diode support for additional diode options
- Internal temperature monitor
  - ±1°C accuracy (-5°C < T_A < 85°C)
- ALERT and THERM outputs for temperature, voltage, and out-of-current limit reporting
- SMBus 2.0 interface
  - Pin-selectable SMBus Address
  - Block Read and Write
- General Purpose I/O
- Available in a RoHS Compliant Package: 14-pin SOIC (EMC1704-1) or 16-pin 4mm x 4mm QFN (EMC1704-2)

Block Diagram



PRODUCT PREVIEW

Order Number(s):

ORDERING NUMBER	PACKAGE	FEATURES
EMC1704-1-YZT-TR	14-pin SOIC (Lead-free ROHS compliant)	Up to three external diodes, current sensor, software set peak detector
EMC1704-2-AP-TR	16-pin 4mm x 4mm QFN (Lead-free ROHS compliant)	Up to three external diodes, current sensor, hardware/software set peak detector

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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Package Outline

EMC1704-1 Package Drawing (14-Pin SOIC)

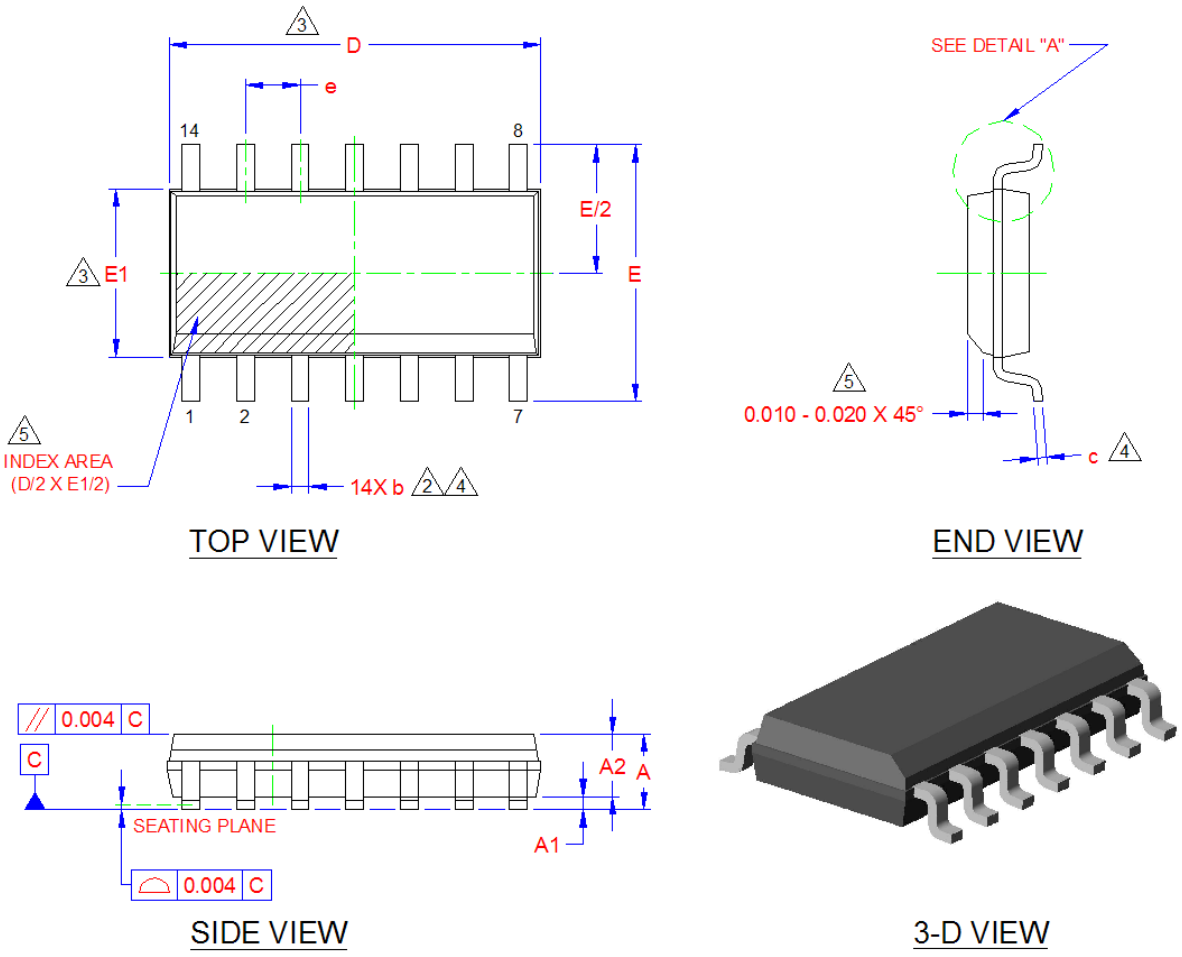


Figure 1 14-Pin SOIC Package Drawings

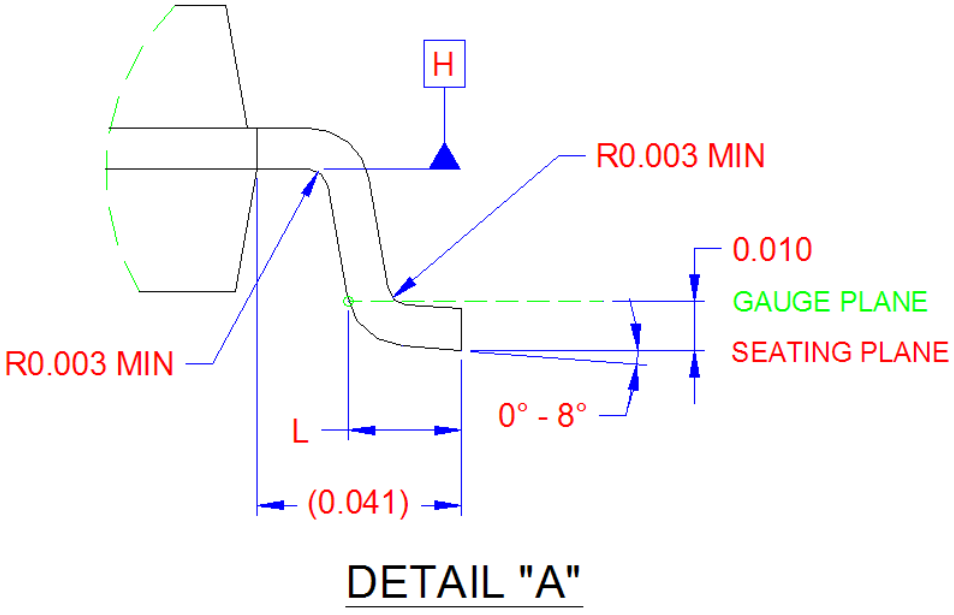


Figure 2 14-Pin SOIC Package Drawings Detail "A"

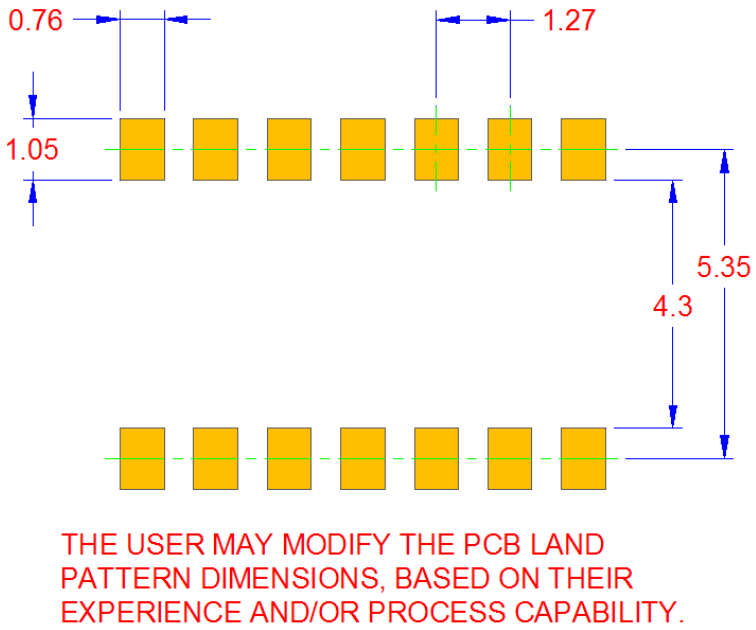


Figure 3 14-Pin SOIC Recommended PCB Land Pattern

COMMON DIMENSIONS					
SYMBOL	MIN	NOM	MAX	NOTE	REMARK
A	0.053	–	0.069	–	OVERALL PKG HEIGHT
A1	0.004	–	0.010	–	STANDOFF
A2	0.049	–	0.065	–	BODY THICKNESS
D	0.336	0.340	0.344	3	"X" BODY SIZE
E	0.228	0.236	0.244	–	LEAD SPAN
E1	0.150	0.154	0.158	3	"Y" BODY SIZE
L	0.016	0.025	0.035	–	LEAD FOOT LENGTH
b	0.012	–	0.020	2,4	LEAD WIDTH
c	0.007	–	0.010	4	LEAD FOOT THICKNESS
e	0.050 BSC			–	LEAD PITCH

NOTES:

1. ALL DIMENSIONS ARE IN INCHES.
2. TRUE POSITION SPREAD TOLERANCE OF EACH LEAD IS ± 0.0049 inches AT MAXIMUM MATERIAL CONDITION. DIMENSION "b" DOES NOT INCLUDE DAMBAR PROTRUSION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OF THE FOOT.
3. DIMENSION "D" DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MAXIMUM MOLD FLASH, PROTRUSIONS OR GATE BURRS IS 0.006" PER END. DIMENSION "E1" DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. MAXIMUM INTERLEAD FLASH OR PROTRUSION IS 0.010" PER SIDE. "D1" & "E1" DIMENSIONS ARE DETERMINED AT DATUM PLANE "H" AND INCLUDE ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.
4. "b" & "c" APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.004 TO 0.010" FROM THE LEAD TIP.
5. THE CHAMFER FEATURE IS OPTIONAL. IF IT IS NOT PRESENT, THEN A PIN 1 IDENTIFIER MUST BE LOCATED WITHIN THE INDEX AREA INDICATED.

Figure 4 14-Pin SOIC Dimensions and Notes

EMC1704-2 Package Drawing (16-Pin QFN 4mm x 4mm)

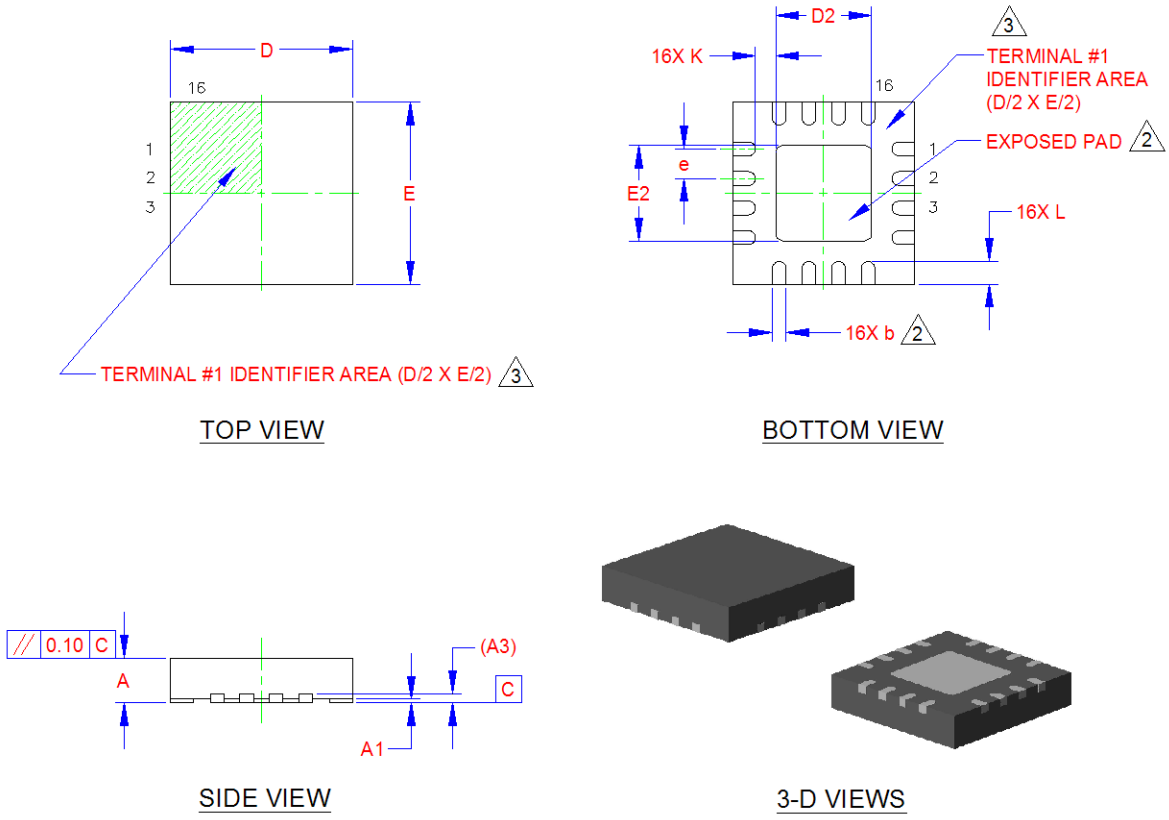
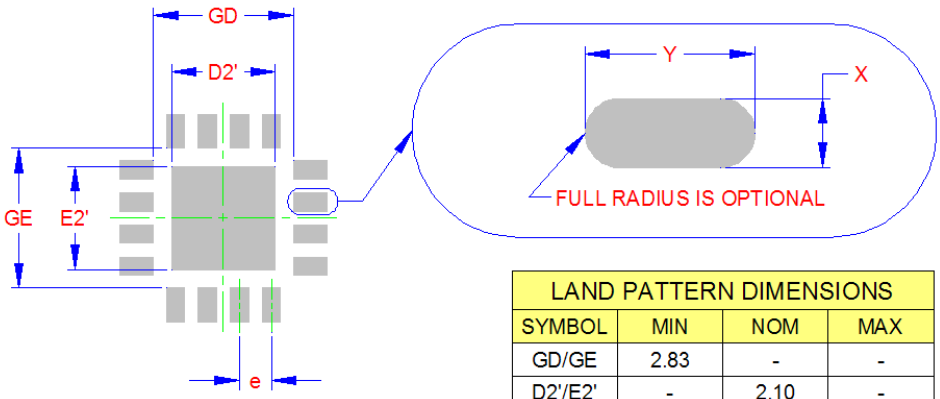


Figure 5 16-Pin QFN 4mm x 4mm Package Drawings

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 6 16-Pin QFN 4mm x 4mm Dimensions and Notes



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 16-Pin QFN 4mm x 4mm PCB Footprint