

LM(2)5088-1/2 Quick Start Component Calculator

Date:1 Dec 2008

Ajay Hari

Version 1.1

Note: The components calculated in this worksheet are reasonable starting values for a design using the LM(2)5088. They are not optimized for any particular performance attribute.

Step 1 General Requirements

Enter Design parameters in the shaded Cells

|                                       |     |
|---------------------------------------|-----|
| Vin(min)(V)                           | 35  |
| Vin(max)(V)                           | 36  |
| Vout(V)                               | 32  |
| Max. Load Current (A)                 | 1.5 |
| Ripple Current % of Max. Load Current | 20% |
| Peak-Peak output voltage ripple(mV)   | 20  |
| Max. output volts deviation(mV)       | 100 |

Step 2 Controller Selection

|                               |           |
|-------------------------------|-----------|
| Select the Controller Version | Restart   |
| Recommended Device            | LM25088-2 |

Step 3 Switching Frequency

Part will enter into low dropout mode at VinMin, Decrease Fsw or, Change Vin/Vout range

Step 4 Frequency Programming

|                                        |       |
|----------------------------------------|-------|
| Fsw(kHz)                               | 250   |
| RRT(kΩ)                                | 24.47 |
| L(μH)                                  | 47.4  |
| Target(% Beyond Max. Load)             | 10%   |
| Peak Load Current at Current Limit (A) | 1.815 |
| Current Sense Resistor (Rs)(mΩ)        | 26.6  |

Step 5 Inductor Value

Step 6 Current Limit

Step 7 Ramp Configuration

|           |     |
|-----------|-----|
| CRamp(pF) | 892 |
| Rramp(kΩ) | 52  |

Step 8 Output Capacitors

|                        |     |
|------------------------|-----|
| COU1(uF)               | 20  |
| COU2(uF)               | 390 |
| Max. Allowable ESR(mΩ) | 67  |
| COU_TOTAL (uF)         | 410 |

Step 9 Input Capacitors

|                         |     |
|-------------------------|-----|
| Input Capacitor Cin(uF) | 3.0 |
|-------------------------|-----|

Step 10 VIN UV Shutdown

|                      |       |
|----------------------|-------|
| Select "Yes" or "No" | Yes   |
| UV Voltage (V)       | 4.5   |
| Ruv2(kΩ)             | 54.9  |
| Ruv1(kΩ)             | 18.43 |

Step 11 Feedback Resistors

|           |       |
|-----------|-------|
| RFB1 (kΩ) | 1.62  |
| RFB2 (kΩ) | 41.40 |

Step 12 Compensation Network

|                 |      |
|-----------------|------|
| Bandwidth (kHz) | 20   |
| RCOMP(kΩ)       | 27.8 |
| CCOMP(pF)       | 2860 |
| CHF(pF)         | 47   |

Step 13 Soft Start Capacitor

|                               |       |
|-------------------------------|-------|
| Soft-Start Time (ms)          | 1     |
| Soft-Start Capacitor Css (uF) | 0.008 |

Step 14 CBOOT & VCC Capacitor

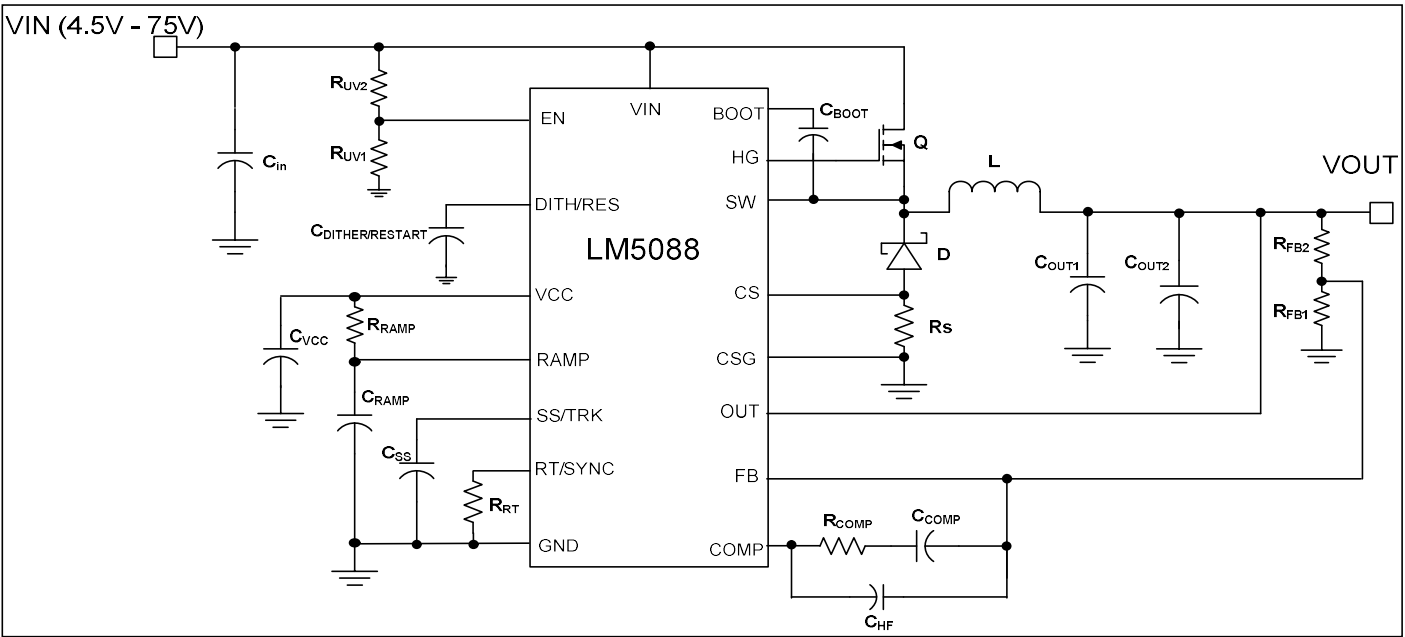
|                                          |     |
|------------------------------------------|-----|
| FET total gate charge QT (nano Coulombs) | 19  |
| CBOOT(nF)                                | 62  |
| CVCC(uF)                                 | 0.6 |

Step 15 Dither Capacitor(LM(2)5088-1)

|    |    |
|----|----|
| NA | NA |
|----|----|

Step 16 Restart Capacitor(LM(2)5088-2)

|                                            |        |
|--------------------------------------------|--------|
| Allowable current limit overload time (ms) | 280    |
| Hiccup Sleep Time (ms)                     | 9722   |
| Cres(uF)                                   | 11.667 |



LM5088 List of Components

| Component              | Description                  | Value          | Rating |
|------------------------|------------------------------|----------------|--------|
| Cin                    | Input capacitor              | 5uF            | 47 V   |
| CRamp                  | Ramp capacitor               | 892pF          | 5 V    |
| Css                    | Soft start capacitor         | 0.008uF        | 5 V    |
| COU1                   | Output capacitor             | 20uF           | 35 V   |
| COU2                   | Output capacitor             | 390uF          | 35 V   |
| CCOMP                  | Compensation capacitor       | 2860pF         | 35 V   |
| CHF                    | Compensation capacitor       | 29pF           | 35 V   |
| CVCC                   | VCC bypass capacitor         | 0.617uF        | 16V    |
| CBOOT                  | Highside Bootstrap capacitor | 61.688nF       | 16V    |
| CDITHER (LM(2)5088-1)  | Dither Capacitor             | NA             | NA     |
| CRESTART (LM(2)5088-2) | Hiccup Restart               | 11.667uF       | 5V     |
| RFB1                   | Feedback resistor            | 1.62 kohm      | 1/16 W |
| RFB2                   | Feedback resistor            | 41.40 kohm     | 1/16 W |
| RUV1                   | UVLO divider resistor        | 18.43 kohm     | 1/16W  |
| RUV2                   | UVLO divider resistor        | 54.90 kohm     | 1/16W  |
| Rs                     | Sense Resistor               | 26.58 mohms    | 1/4 W  |
| RRT                    | Oscillator Timing resistor   | 24.47 kohms    | 1/16 W |
| L                      | Inductor                     | 47.41 uH       | 2.0 A  |
| RRamp                  | Optional Ramp resistor       | 52 kohms       | 1/16 W |
| RCOMP                  | Compensation resistor        | 28 kohm        | 1/8 W  |
| D                      | Schottky Diode               | Voltage Rating | 40 V   |
| Q                      | MOSFET                       | Voltage Rating | 40 V   |

| Assumptions         |        |
|---------------------|--------|
| Ambient Temperature | 85 C   |
| Package RJA         | 40 C/W |

|                      |         |         |         |         |         |         |         |         |         |         |         |
|----------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| VIN                  | 35.0 V  | 35.1 V  | 35.2 V  | 35.3 V  | 35.4 V  | 35.5 V  | 35.6 V  | 35.7 V  | 35.8 V  | 35.9 V  | 36.0 V  |
| IC Power             | 0.411 W | 0.412 W | 0.414 W | 0.415 W | 0.416 W | 0.417 W | 0.418 W | 0.419 W | 0.421 W | 0.422 W | 0.423 W |
| Delta TJ above TA    | 16 C    | 16 C    | 17 C    | 17 C    | 17 C    | 17 C    | 17 C    | 17 C    | 17 C    | 17 C    | 17 C    |
| Junction temperature | 101 C   | 101 C   | 102 C   | 102 C   | 102 C   | 102 C   | 102 C   | 102 C   | 102 C   | 102 C   | 102 C   |

