**CONFIDENTIAL**

**Register Specification**

**1 Register Specification**

**1.1 Registers Chapter**

**Table 1-1 Register Address Space**

|  |  |  |  |
| --- | --- | --- | --- |
| **Module** | **Base Address** | **End Address** | **Note** |
| BusInterface | 0H | FFH | Slave interface |

**Table 1-2 Register Overview**

|  |  |  |  |
| --- | --- | --- | --- |
| **Register Short Name** | **Register Long Name** | **Offset Address** | **Reset Value** |
| **Conf\_Sig** | Configuration Signature | 00H | BAH |
| **Conf\_Gen\_1** | General Configuration 1 | 01H | 80H |
| **Conf\_Gen\_2** | General Configuration 2 | 02H | 03H |
| **Conf\_Gen\_3** | General Configuration 3 | 03H | 1CH |
| **Conf\_wwd** | Window Watchdog | 04H | 56H |
| **Tl\_vs** | Vs Over- and Undervoltage Thresholds | 05H | 07H |
| **Tl\_vdh** | VDH Over- and Undervoltage Thresholds | 06H | A0H |
| **Tl\_cbvcc** | CB Under- and VCC Under- and Overvoltage  Thresholds | 07H | 95H |
| **Fm\_1** | Charge Pump/Bootstrap Failure Modes | 08H | 30H |
| **Fm\_2** | Miscellaneous Failure Modes | 09H | 70H |
| **Fm\_3** | Vs & VDH & VCC Undervoltage Failure Modes | 0AH | 10H |
| **Fm\_4** | Vs & VDH & VCC Overvoltage Failure Modes | 0BH | 20H |
| **Fm\_5** | Short Circuit Detection & Signal Path Supervision  Failure Modes | 0CH | 60H |
| **Dt\_ls** | Dead Time Low-side | 0DH | 0EH |
| **Dt\_hs** | Dead Time High-side | 0EH | 0EH |
| **Ft\_1** | Undervoltage Filter Times | 0FH | 85H |
| **Ft\_2** | Overvoltage and VCC Filter Times | 10H | 50H |
| **Ft\_3** | Overtemperature & Short Circuit Detection Filter  Times | 11H | 0EH |
| **Ft\_4** | Overcurrent Filter Time | 12H | 02H |
| **Fm\_6** | Overcurrent Failure Modes | 13H | 00H |
| **Op\_gai\_1** | Current Sense Amplifier 1&2 - Gain 1 | 20H | 33H |
| **Op\_gai\_2** | Current Sense Amplifier 1&2 - Gain 2 | 21H | 55H |
| **Op\_0cl** | Current Sense Amplifier Zero Current Offset | 23H | 5FH |
| **op\_con** | Current Sense Amplifier Configuration | 24H | 07H |
| **Sc\_ls\_1** | Short Circuit Detection Threshold Low-side 1 | 25H | 1AH |
| **Sc\_ls\_2** | Short Circuit Detection Threshold Low-side 2 | 26H | 1AH |

**CONFIDENTIAL**

**Register Specification**

**Table 1-2 Register Overview** (cont’d)

|  |  |  |  |
| --- | --- | --- | --- |
| **Register Short Name** | **Register Long Name** | **Offset Address** | **Reset Value** |
| **Sc\_ls\_3** | Short Circuit Detection Threshold Low-side 3 | 27H | 1AH |
| **Sc\_hs\_1** | Short Circuit Detection Threshold High-side 1 | 28H | 1AH |
| **Sc\_hs\_2** | Short Circuit Detection Threshold High-side 2 | 29H | 1AH |
| **Sc\_hs\_3** | Short Circuit Detection Threshold High-side 3 | 2AH | 1AH |
| **Misc\_ctr** | Shift Phase Voltage Feedback and CSA Gain | 2CH | 00H |
| **nop** | No Operation | 32H | 00H |
| **Sel\_st\_1** | Self Test Selection 1 | 35H | 00H |
| **Sel\_st\_2** | Self Test Selection 2 | 36H | 00H |
| **En\_st** | Self Test Mode Entry | 37H | 80H |
| **Om\_over** | Operation Mode Overview | 40H | 00H |
| **Err\_over** | Error Overview | 41H | 00H |
| **Ser** | Special Event Register | 42H | 00H |
| **Err\_i\_1** | Internal Errors 1 | 43H | 00H |
| **Err\_i\_2** | Internal Errors 2 | 44H | 00H |
| **Err\_e** | External Errors | 45H | 00H |
| **Err\_sd** | Shutdown Errors | 46H | 00H |
| **Err\_scd** | Short Circuit Errors | 47H | 00H |
| **Err\_spiconf** | SPI Communication and Configuration Errors | 4AH | 00H |
| **Err\_op\_12** | Current Sense Amplifiers 1 & 2 Errors | 4BH | 00H |
| **Err\_outp** | Digital Output Pin Errors | 4DH | 00H |
| **temp\_ls1** | Low-side 1 Output Stage Temperature | 5AH | 00H |

The registers are addressed wordwise.

**1.1.1 Configuration registers**

**Configuration Signature**

|  |  |  |
| --- | --- | --- |
| **Conf\_Sig** | **Offset** | **Reset Value** |
| **Configuration Signature** | **00H** | **BAH** |

**CONFIDENTIAL**

**Register Specification**

7 6 5 4 3 2 1 0

CRC

rmw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| CRC | 7:0 | rmw | **CRC8 Signature Byte**  10111010B CRC8 for default configuration register values |

**General Configuration 1**

|  |  |  |
| --- | --- | --- |
| **Conf\_Gen\_1** | **Offset** | **Reset Value** |
| **General Configuration 1** | **01H** | **80H** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|  | tl\_ot\_w |  | in\_diag  \_act | spi\_wwd  \_act | limp\_ac t | vcc\_sup  \_off | vcc\_sel ect |
|  | rmw |  | rmw | rmw | rmw | rmw | rmw |

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| tl\_ot\_w | 7:5 | rmw | **Overtemperature Detection Threshold**  111B 125°C  110B 130°C  101B 135°C  100B 140°C (default)  011B 145°C  010B 150°C  001B 155°C  000B 160°C |
| in\_diag\_act | 4 | rmw | **fixed bit field for TLE9180 basic**  0B fixed value for TLE9180 basic |
| spi\_wwd\_act | 3 | rmw | **fixed bit field for TLE9180 basic**  0B fixed value for TLE9180 basic |
| limp\_act | 2 | rmw | **fixed bit field for TLE9180 basic**  0B fixed value for TLE9180 basic |
| vcc\_sup\_off | 1 | rmw | **VCC Supervision**  1B Disabled  0B Enabled (default) |
| vcc\_select | 0 | rmw | **VCC Monitoring Threshold**  1B 5V selected as VCC supply voltage  0B 3.3V selected as VCC supply voltage (default) |

**CONFIDENTIAL**

**Register Specification**

**General Configuration 2**

|  |  |  |
| --- | --- | --- |
| **Conf\_Gen\_2** | **Offset** | **Reset Value** |
| **General Configuration 2** | **02H** | **3H** |

7 6 5 4 3 2 1 0

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| tl\_oc\_o p | dis\_ov\_  bh | dis\_ov\_  ld\_vdh | dis\_sd\_  vdh | en\_vdh3 | en\_op3 | en\_op2 | en\_op1 |

rmw

rmw

rmw

rmw

rmw

rmw

rmw

rmw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| tl\_oc\_op | 7 | rmw | **Threshold Level Overcurrent Detection Current Sense Amplifiers**  1B 3.3V Overcurrent Detection Threshold  0B 5V Overcurrent Detection Threshold (default) |
| dis\_ov\_bh | 6 | rmw | **Disable Overvoltage Detection of Bootstrap Capacitors**  1B OV BSx disabled  0B OV BSx enabled (default) |
| dis\_ov\_ld\_vdh | 5 | rmw | **Disable Load Dump Overvoltage Detection at pin VDH**  1B OV CH2 disabled  0B OV SH2 enabled (default) |
| dis\_sd\_vdh | 4 | rmw | **fixed bit field for TLE9180 basic**  0B fixed value for TLE9180 basic |
| en\_vdh3 | 3 | rmw | **Enable 3 VDH sense pins**  1B 3 VDH sense pins and 1 VDHP power pin enabled  0B 1 VDH pin selected (default) |
| en\_op3 | 2 | rmw | **fixed bit field for TLE9180 basic**  0B fixed value for TLE9180 basic |
| en\_op2 | 1 | rmw | **Enable Current Sense Amplifier 2**  1B Current Sense Amplifier 2 enabled (default)  0B Current Sense Amplifier 2 deactivated |
| en\_op1 | 0 | rmw | **Enable Current Sense Amplifier 1 and reference output buffer**  1B Current Sense Amplifier 1 and reference output buffer enabled  (default)  0B Current Sense Amplifier 1 and reference output buffer deactivated |

**General Configuration 3**

|  |  |  |
| --- | --- | --- |
| **Conf\_Gen\_3** | **Offset** | **Reset Value** |
| **General Configuration 3** | **03H** | **1CH** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Res | en\_ART | apc\_tact | apc\_conf | art\_scd |
|  | rmw | rmw | rmw | rmw |

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| Res | 7 | none |  |
| en\_ART | 6 | rmw | **fixed bit field for TLE9180 basic**  0B fixed value for TLE9180 basic |
| apc\_tact | 5:3 | rmw | **fixed bit field for TLE9180 basic**  011B fixed value for TLE9180 basic |
| apc\_conf | 2:1 | rmw | **fixed bit field for TLE9180 basic**  10B fixed value for TLE9180 basic |
| art\_scd | 0 | rmw | **fixed bit field for TLE9180 basic**  0B fixed value for TLE9180 basic |

**Window Watchdog**

|  |  |  |
| --- | --- | --- |
| **Conf\_wwd** | **Offset** | **Reset Value** |
| **Window Watchdog** | **04H** | **56H** |

7 6 5 4 3 2 1 0

wwd\_count

rmw

wwd\_ratio

rmw

wwd\_tp

rmw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| wwd\_count | 7:5 | rmw | **fixed bit field for TLE9180 basic**  010B fixed value for TLE9180 basic |
| wwd\_ratio | 4:2 | rmw | **fixed bit field for TLE9180 basic**  101B fixed value for TLE9180 basic |
| wwd\_tp | 1:0 | rmw | **fixed bit field for TLE9180 basic**  10B fixed value for TLE9180 basic |

**Vs Over- and Undervoltage Thresholds**

|  |  |  |
| --- | --- | --- |
| **Tl\_vs** | **Offset** | **Reset Value** |
| **Vs Over- and Undervoltage Thresholds** | **05H** | **7H** |

tl\_ov\_vs

rmw

tl\_uv\_vs

rmw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| tl\_ov\_vs | 7:4 | rmw | **Vs Overvoltage Threshold**  1111B 59.77V  1110B 57.94V  1101B 56.11V  1100B 54.14V  1011B 52.15V  1010B 50.01V  1001B 48.18V  1000B 43.91V  0111B 39.95V  0110B 35.98V  0101B 34.15V  0100B 32.02V  0011B 28.05V  0010B 24.09V  0001B 20.13V  0000B 18.00V (default) |
| tl\_uv\_vs | 3:0 | rmw | **Vs Undervoltage Threshold**  1111B 9.45V  1110B 9.15V  1101B 8.84V  1100B 8.54V  1011B 8.23V  1010B 7.93V  1001B 7.62V  1000B 7.32V  0111B 7.01V (default)  0110B 6.71V  0101B 6.40V  0100B 6.10V  0011B 5.79V  0010B 5.49V  0001B 5.18V  0000B 4.88V |

**VDH Over- and Undervoltage Thresholds**

|  |  |  |
| --- | --- | --- |
| **Tl\_vdh** | **Offset** | **Reset Value** |
| **VDH Over- and Undervoltage Thresholds** | **06H** | **A0H** |

tl\_ov\_vdh

rmw

tl\_uv\_vdh

rmw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| tl\_ov\_vdh | 7:4 | rmw | **VDH Overvoltage Threshold**  1111B 75.02V  1110B 70.14V  1101B 64.95V  1100B 60.07V  1011B 57.94V  1010B 56.11V (default)  1001B 53.97V  1000B 50.01V  0111B 48.18V  0110B 39.95V  0101B 35.98V  0100B 32.02V  0011B 28.05V  0010B 24.09V  0001B 20.13V  0000B 18.00V |
| tl\_uv\_vdh | 3:0 | rmw | **VDH Undervoltage Threshold**  1111B 39.95V  1110B 35.07V  1101B 29.88V  1100B 21.96V  1011B 20.13V  1010B 17.99V  1001B 11.89V  1000B 10.98V  0111B 10.06V  0110B 9.15V  0101B 7.93V  0100B 7.01V  0011B 6.10V  0010B 5.49V  0001B 4.88V  0000B 3.96V (default) |

**CB Under- and VCC Under- and Overvoltage Thresholds**

|  |  |  |
| --- | --- | --- |
| **Tl\_cbvcc** | **Offset** | **Reset Value** |
| **CB Under- and VCC Under- and Overvoltage Thresholds** | **07H** | **95H** |

tl\_uv\_cb

rmw

tl\_ov\_vcc

rmw

tl\_uv\_vcc

rmw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| tl\_uv\_cb | 7:4 | rmw | **CB Undervoltage Threshold**  1111B 10.44V  1110B 10.22V  1101B 9.99V  1100B 9.76V  1011B 9.53V  1010B 9.30V  1001B 9.07V (default)  1000B 8.84V  0111B 8.61V  0110B 8.39V  0101B 8.16V  0100B 7.93V  0011B 7.70V  0010B 7.47V  0001B 7.24V  0000B 7.01V |
| tl\_ov\_vcc | 3:2 | rmw | **VCC Overvoltage Threshold**  11B Reserved  10B 10% of configured VCC supply voltage  01B 4% of configured VCC supply voltage (default)  00B 2% of configured VCC supply voltage |
| tl\_uv\_vcc | 1:0 | rmw | **VCC Undervoltage Threshold**  11B Reserved  10B 10% of configured VCC supply voltage  01B 4% of configured VCC supply voltage (default)  00B 2% of configured VCC supply voltage |

**Charge Pump/Bootstrap Failure Modes**

|  |  |  |
| --- | --- | --- |
| **Fm\_1** | **Offset** | **Reset Value** |
| **Charge Pump/Bootstrap Failure Modes** | **08H** | **30H** |

7 6 5 4 3 2 1 0

fm\_uv\_cb rmw

fm\_cp1\_

off rmw

fm\_cp2\_

off rmw

Res fm\_uv\_bs rmw

**CONFIDENTIAL**

**Register Specification**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| fm\_uv\_cb | 7:6 | rmw | **CB Undervoltage Failure Behavior**  11B LE - Latched Error  10B ARE - Auto Restart Error  01B ERR - Error  00B W - Warning (default) |
| fm\_cp1\_off | 5 | rmw | **Overload Charge Pump 1 Failure Behavior**  1B Shutdown of output stages (default)  0B No shutdown of output stages |
| fm\_cp2\_off | 4 | rmw | **Overload Charge Pump 2 Failure Behavior**  1B Shutdown of output stages (default)  0B No shutdown of output stages |
| Res | 3:2 | none |  |
| fm\_uv\_bs | 1:0 | rmw | **Undervoltage Bootstrap Capacitor Failure Behavior**  11B LE - Latched Error  10B ARE - Auto Restart Error  01B ERR - Error  00B W - Warning (default) |

**Miscellaneous Failure Modes**

|  |  |  |
| --- | --- | --- |
| **Fm\_2** | **Offset** | **Reset Value** |
| **Miscellaneous Failure Modes** | **09H** | **70H** |

7 6 5 4 3 2 1 0

fm\_act\_apc rmw

fm\_spi\_wwd rmw

Res fm\_ot\_w rmw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| fm\_act\_apc | 7:6 | rmw | **fixed bit field for TLE9180 basic**  01B fixed value for TLE9180 basic |
| fm\_spi\_wwd | 5:4 | rmw | **fixed bit field for TLE9180 basic**  11B fixed value for TLE9180 basic |
| Res | 3:2 | none |  |
| fm\_ot\_w | 1:0 | rmw | **Overtemperature Detection Failure Behavior**  11B LE - Latched Error  10B ARE - Auto Restart Error  01B ERR - Error  00B W - Warning (default) |

**CONFIDENTIAL**

**Register Specification**

**Vs & VDH & VCC Undervoltage Failure Modes**

|  |  |  |
| --- | --- | --- |
| **Fm\_3** | **Offset** | **Reset Value** |
| **Vs & VDH & VCC Undervoltage Failure Modes** | **0AH** | **10H** |

7 6 5 4 3 2 1 0

Res fm\_uv\_vs

rmw

fm\_uv\_vdh

rmw

fm\_uv\_vcc

rmw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| Res | 7:6 | none |  |
| fm\_uv\_vs | 5:4 | rmw | **Vs Undervoltage Failure Behavior**  11B LE - Latched Error  10B ARE - Auto Restart Error  01B ERR - Error (default)  00B W - Warning |
| fm\_uv\_vdh | 3:2 | rmw | **VDH Undervoltage Failure Behavior**  11B LE - Latched Error  10B ARE - Auto Restart Error  01B ERR - Error  00B W - Warning (default) |
| fm\_uv\_vcc | 1:0 | rmw | **VCC Undervoltage Failure Behavior**  11B LE - Latched Error  10B ARE - Auto Restart Error  01B ERR - Error  00B W - Warning (default) |

**Vs & VDH & VCC Overvoltage Failure Modes**

|  |  |  |
| --- | --- | --- |
| **Fm\_4** | **Offset** | **Reset Value** |
| **Vs & VDH & VCC Overvoltage Failure Modes** | **0BH** | **20H** |

7 6 5 4 3 2 1 0

Res fm\_ov\_vs rmw

fm\_ov\_vdh rmw

fm\_ov\_vcc rmw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| Res | 7 | none |  |

**CONFIDENTIAL**

**Register Specification**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| fm\_ov\_vs | 6:5 | rmw | **Vs Overvoltage Failure Behavior**  11B LE - Latched Error  10B ARE - Auto Restart Error  01B ERR - Error (default)  00B W - Warning |
| fm\_ov\_vdh | 4:2 | rmw | **VDH Overvoltage Failure Behavior**  111B LE1 - Latched Error all HS FETs off only  110B ARE1 - Auto Restart Error all HS FETs off only  101B Reserved5  100B Reserved4  011B LE - Latched Error all FETs off  010B ARE - Auto Restart Error  001B ERR - Error  000B W - Warning (default) |
| fm\_ov\_vcc | 1:0 | rmw | **VCC Overvoltage Failure Behavior**  11B LE - Latched Error  10B ARE - Auto Restart Error  01B ERR - Error  00B W - Warning (default) |

**Short Circuit Detection & Signal Path Supervision Failure Modes**

|  |  |  |
| --- | --- | --- |
| **Fm\_5** | **Offset** | **Reset Value** |
| **Short Circuit Detection & Signal Path Supervision Failure Modes** | **0CH** | **60H** |

7 6 5 4 3 2 1 0

fm\_outp

fm\_scd

rmw

\_ol rmw

fm\_osfb

rmw

fm\_in\_diag

rmw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| fm\_scd | 7:5 | rmw | **Short Ciruit Detection Failure Behavior**  111B LE2 - Latched Error, affected external FET off  110B LE1 - Latched Error, affected half bridge off  101B Reserved5  100B Reserved4  011B LE - Latched Error, all external FETs off (default)  010B ARE - Auto Restart Error  001B ERR - Error  000B W - Warning |
| fm\_outp\_ol | 4 | rmw | **Digital Output Pin Overload Failure Behavior**  1B Shutdown of output stages  0B No shutdown of output stages (default) |

**CONFIDENTIAL**

**Register Specification**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| fm\_osfb | 3:2 | rmw | **Output Stage Feedback Failure Behavior**  11B LE - Latched Error  10B ARE - Auto Restart Error  01B ERR - Error  00B W - Warning (default) |
| fm\_in\_diag | 1:0 | rmw | **fixed bit field for TLE9180 basic**  00B fixed value for TLE9180 basic |

**Dead Time Low-side**

|  |  |  |
| --- | --- | --- |
| **Dt\_ls** | **Offset** | **Reset Value** |
| **Dead Time Low-side** | **0DH** | **EH** |

7 6 5 4 3 2 1 0

dtls

rmw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| dtls | 7:0 | rmw | **Dead time for low-side output stages**  [formula: value\*35.7+107; unit: ns]  10100101B 6µs - maximum dead time  00001110B 600ns (default)  00000000B 107ns - minimum dead time |

**Dead Time High-side**

|  |  |  |
| --- | --- | --- |
| **Dt\_hs** | **Offset** | **Reset Value** |
| **Dead Time High-side** | **0EH** | **EH** |

7 6 5 4 3 2 1 0

dths rmw

**CONFIDENTIAL**

**Register Specification**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| dths | 7:0 | rmw | **Dead time for high-side output stages**  [formula: value\*35.7+107; unit: ns]  10100101B 6µs - maximum dead time  00001110B 600ns (default)  00000000B 107ns - minimum dead time |

**Undervoltage Filter Times**

|  |  |  |
| --- | --- | --- |
| **Ft\_1** | **Offset** | **Reset Value** |
| **Undervoltage Filter Times** | **0FH** | **85H** |

7 6 5 4 3 2 1 0

f\_uv\_bs

rmw

f\_uv\_cb

rmw

f\_uv\_vdh

rmw

f\_uv\_vs

rmw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| f\_uv\_bs | 7:6 | rmw | **Bootstrap Capacitor Undervoltage Filter Time**  11B 10µs  10B 5µs (default)  01B 3µs  00B 1µs |
| f\_uv\_cb | 5:4 | rmw | **CB Undervoltage Filter Time**  11B 100µs  10B 50µs  01B 25µs  00B 10µs (default) |
| f\_uv\_vdh | 3:2 | rmw | **VDH Undervoltage Filter Time**  11B 100µs  10B 50µs  01B 25µs (default)  00B 10µs |
| f\_uv\_vs | 1:0 | rmw | **Vs Undervoltage Filter Time**  11B 100µs  10B 50µs  01B 25µs (default)  00B 10µs |

**Overvoltage and VCC Filter Times**

**CONFIDENTIAL**

**Register Specification**

|  |  |  |
| --- | --- | --- |
| **Ft\_2** | **Offset** | **Reset Value** |
| **Overvoltage and VCC Filter Times** | **10H** | **50H** |

7 6 5 4 3 2 1 0

f\_uv\_vcc

rmw

f\_ov\_vcc

rmw

f\_ov\_vdh

rmw

f\_ov\_vs

rmw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| f\_uv\_vcc | 7:6 | rmw | **VCC Undervoltage Filter Time**  11B 100µs  10B 50µs  01B 25µs (default)  00B 10µs |
| f\_ov\_vcc | 5:4 | rmw | **VCC Overvoltage Filter Time**  11B 100µs  10B 50µs  01B 25µs (default)  00B 10µs |
| f\_ov\_vdh | 3:2 | rmw | **VDH Overvoltage Filter Time**  11B 100µs  10B 50µs  01B 25µs  00B 10µs (default) |
| f\_ov\_vs | 1:0 | rmw | **Vs Overvoltage Filter Time**  11B 100µs  10B 50µs  01B 25µs  00B 10µs (default) |

**Overtemperature & Short Circuit Detection Filter Times**

|  |  |  |
| --- | --- | --- |
| **Ft\_3** | **Offset** | **Reset Value** |
| **Overtemperature & Short Circuit Detection Filter Times** | **11H** | **EH** |

7 6 5 4 3 2 1 0

f\_ot\_sd rmw

f\_ot\_w rmw

f\_bl\_scd rmw

f\_fi\_scd rmw

**CONFIDENTIAL**

**Register Specification**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| f\_ot\_sd | 7 | rmw | **Overtemperature Shutdown Filter Time**  1B 50µs  0B 10µs (default) |
| f\_ot\_w | 6:5 | rmw | **Overtemperature Detection Filter Time**  11B 500µs  10B 100µs  01B 50µs  00B 10µs (default) |
| f\_bl\_scd | 4:2 | rmw | **Short Circuit Detection Blanking Time**  111B 15µs  110B 10µs  101B 5µs  100B 3.5µs  011B 2µs (default)  010B 1.5µs  001B 1.0µs  000B 0.5µs |
| f\_fi\_scd | 1:0 | rmw | **Short Circuit Detection Filter Time**  11B 6µs  10B 4µs (default)  01B 2µs  00B 1µs |

**Overcurrent Filter Time**

|  |  |  |
| --- | --- | --- |
| **Ft\_4** | **Offset** | **Reset Value** |
| **Overcurrent Filter Time** | **12H** | **2H** |

7 6 5 4 3 2 1 0

Res f\_oc\_op rmw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| Res | 7:2 | none |  |
| f\_oc\_op | 1:0 | rmw | **Current Sense Amplifier Overcurrent Filter Time**  11B 10µs  10B 5µs (default)  01B 3µs  00B 1.5µs |

**CONFIDENTIAL**

**Register Specification**

**Overcurrent Failure Modes**

|  |  |  |
| --- | --- | --- |
| **Fm\_6** | **Offset** | **Reset Value** |
| **Overcurrent Failure Modes** | **13H** | **0H** |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 7 |  | 6 | 5 |  | 4 | 3 |  | 2 | 1 |  | 0 |
|  | Res |  |  | fm\_oc\_op3 |  |  | fm\_oc\_op2 |  |  | fm\_oc\_op1 |  |
|  |  |  |  | rmw |  |  | rmw |  |  | rmw |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| Res | 7:6 | none |  |
| fm\_oc\_op3 | 5:4 | rmw | **Current Sense Amplifier 3 Overcurrent Failure Behavior**  11B LE - Latched Error  10B ARE - Auto Restart Error  01B ERR - Error  00B W - Warning (default) |
| fm\_oc\_op2 | 3:2 | rmw | **Current Sense Amplifier 2 Overcurrent Failure Behavior**  11B LE - Latched Error  10B ARE - Auto Restart Error  01B ERR - Error  00B W - Warning (default) |
| fm\_oc\_op1 | 1:0 | rmw | **Current Sense Amplifier 1 Overcurrent Failure Behavior**  11B LE - Latched Error  10B ARE - Auto Restart Error  01B ERR - Error  00B W - Warning (default) |

**1.1.2 Control registers**

**Current Sense Amplifier 1&2 - Gain 1**

|  |  |  |
| --- | --- | --- |
| **Op\_gai\_1** | **Offset** | **Reset Value** |
| **Current Sense Amplifier 1&2 - Gain 1** | **20H** | **33H** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Res |  | op1\_gai1 |  | Res |  | op2\_gai1 |  |
|  |  | rw |  |  |  | rw |  |

**CONFIDENTIAL**

**Register Specification**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| Res | 7 | none |  |
| op1\_gai1 | 6:4 | rw | **Current Sense Amplifier 1 - Gain 1**  111B 96  110B 64  101B 48  100B 32  011B 24 (default)  010B 16  001B 12  000B 8 |
| Res | 3 | none |  |
| op2\_gai1 | 2:0 | rw | **Current Sense Amplifier 2 - Gain 1**  111B 96  110B 64  101B 48  100B 32  011B 24 (default)  010B 16  001B 12  000B 8 |

**Current Sense Amplifier 1&2 - Gain 2**

|  |  |  |
| --- | --- | --- |
| **Op\_gai\_2** | **Offset** | **Reset Value** |
| **Current Sense Amplifier 1&2 - Gain 2** | **21H** | **55H** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Res |  | op1\_gai2 |  | Res |  | op2\_gai2 |  |
|  |  | rw |  |  |  | rw |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| Res | 7 | none |  |
| op1\_gai2 | 6:4 | rw | **Current Sense Amplifier 1 - Gain 2**  111B 96  110B 64  101B 48 (default)  100B 32  011B 24  010B 16  001B 12  000B 8 |

**CONFIDENTIAL**

**Register Specification**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| Res | 3 | none |  |
| op2\_gai2 | 2:0 | rw | **Current Sense Amplifier 2 - Gain 2**  111B 96  110B 64  101B 48 (default)  100B 32  011B 24  010B 16  001B 12  000B 8 |

**Current Sense Amplifier Zero Current Offset**

|  |  |  |
| --- | --- | --- |
| **Op\_0cl** | **Offset** | **Reset Value** |
| **Current Sense Amplifier Zero Current Offset** | **23H** | **5FH** |

7 6 5 4 3 2 1 0

zerocl

rw

ofs

rw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| zerocl | 7:6 | rw | **Zero Current Output Voltage Offset**  11B Reserved  10B 2.5V  01B 1.65V (default)  00B 0.4V |
| ofs | 5:0 | rw | **Zero Current Output Voltage Offset Fine Adjustment**  111111B Maximum positive adjustment  011111B No adjustment (default)  000000B Minimum negative adjustment |

**Current Sense Amplifier Configuration**

|  |  |  |
| --- | --- | --- |
| **op\_con** | **Offset** | **Reset Value** |
| **Current Sense Amplifier Configuration** | **24H** | **7H** |

**CONFIDENTIAL**

**Register Specification**

7 6 5 4 3 2 1 0

op1\_cal op2\_cal op3\_cal Res op1\_cal

\_n

op2\_cal

\_n

op3\_cal

\_n

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| op1\_cal | 7 | rwc | **CSA 1 Calibration start**  1B Set calibration (self clearing if completed)  0B No ongoing calibration (default) |
| op2\_cal | 6 | rwc | **CSA 2 Calibration start**  1B Set calibration (self clearing if completed)  0B No ongoing calibration (default) |
| op3\_cal | 5 | rwc | **fixed bit field for TLE9180 basic**  0B fixed value for TLE9180 basic |
| Res | 4:3 | none |  |
| op1\_cal\_n | 2 | rwc | **No CSA 1 Calibration start**  1B No ongoing calibration (default)  0B Set calibration (self clearing if completed) |
| op2\_cal\_n | 1 | rwc | **No CSA 2 Calibration start**  1B No ongoing calibration (default)  0B Set calibration (self clearing if completed) |
| op3\_cal\_n | 0 | rwc | **fixed bit field for TLE9180 basic**  1B fixed value for TLE9180 basic |

**Short Circuit Detection Threshold Low-side 1**

|  |  |  |
| --- | --- | --- |
| **Sc\_ls\_1** | **Offset** | **Reset Value** |
| **Short Circuit Detection Threshold Low-side 1** | **25H** | **1AH** |

7 6 5 4 3 2 1 0

sc\_ls\_1 rw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| sc\_ls\_1 | 7:0 | rw | **Low-side 1 SCD Threshold (positive Two's Complement only)**  [formula: (value-1)\*1.215/104; unit: Volt]  01111111B 1.472V - Maximum SCDL  00011010B 292mV (default)  00000001B 0V - Minimum SCDL |

**CONFIDENTIAL**

**Register Specification**

**Short Circuit Detection Threshold Low-side 2**

|  |  |  |
| --- | --- | --- |
| **Sc\_ls\_2** | **Offset** | **Reset Value** |
| **Short Circuit Detection Threshold Low-side 2** | **26H** | **1AH** |

7 6 5 4 3 2 1 0

sc\_ls\_2

rw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| sc\_ls\_2 | 7:0 | rw | **Low-side 2 SCD Threshold (positive Two's Complement only)**  [formula: (value-1)\*1.215/104; unit: Volt]  01111111B 1.472V - Maximum SCDL  00011010B 292mV (default)  00000001B 0V - Minimum SCDL |

**Short Circuit Detection Threshold Low-side 3**

|  |  |  |
| --- | --- | --- |
| **Sc\_ls\_3** | **Offset** | **Reset Value** |
| **Short Circuit Detection Threshold Low-side 3** | **27H** | **1AH** |

7 6 5 4 3 2 1 0

sc\_ls\_3

rw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| sc\_ls\_3 | 7:0 | rw | **Low-side 3 SCD Threshold (positive Two's Complement only)**  [formula: (value-1)\*1.215/104; unit: Volt]  01111111B 1.472V - Maximum SCDL  00011010B 292mV (default)  00000001B 0V - Minimum SCDL |

**Short Circuit Detection Threshold High-side 1**

|  |  |  |
| --- | --- | --- |
| **Sc\_hs\_1** | **Offset** | **Reset Value** |
| **Short Circuit Detection Threshold High-side 1** | **28H** | **1AH** |

**CONFIDENTIAL**

**Register Specification**

7 6 5 4 3 2 1 0

sc\_hs\_1

rw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| sc\_hs\_1 | 7:0 | rw | **High-side 1 SCD Threshold (positive Two's Complement only)**  [formula: (value-1)\*1.215/104; unit: Volt]  01111111B 1.472V - Maximum SCDL  00011010B 292mV (default)  00000001B 0V - Minimum SCDL |

**Short Circuit Detection Threshold High-side 2**

|  |  |  |
| --- | --- | --- |
| **Sc\_hs\_2** | **Offset** | **Reset Value** |
| **Short Circuit Detection Threshold High-side 2** | **29H** | **1AH** |

7 6 5 4 3 2 1 0

sc\_hs\_2

rw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| sc\_hs\_2 | 7:0 | rw | **High-side 2 SCD Threshold (positive Two's Complement only)**  [formula: (value-1)\*1.215/104; unit: Volt]  01111111B 1.472V - Maximum SCDL  00011010B 292mV (default)  00000001B 0V - Minimum SCDL |

**Short Circuit Detection Threshold High-side 3**

|  |  |  |
| --- | --- | --- |
| **Sc\_hs\_3** | **Offset** | **Reset Value** |
| **Short Circuit Detection Threshold High-side 3** | **2AH** | **1AH** |

7 6 5 4 3 2 1 0

sc\_hs\_3 rw

**CONFIDENTIAL**

**Register Specification**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| sc\_hs\_3 | 7:0 | rw | **High-side 3 SCD Threshold (positive Two's Complement only)**  [formula: (value-1)\*1.215/104; unit: Volt]  01111111B 1.472V - Maximum SCDL  00011010B 292mV (default)  00000001B 0V - Minimum SCDL |

**Shift Phase Voltage Feedback and CSA Gain**

|  |  |  |
| --- | --- | --- |
| **Misc\_ctr** | **Offset** | **Reset Value** |
| **Shift Phase Voltage Feedback and CSA Gain** | **2CH** | **0H** |

7 6 5 4 3 2 1 0

sh\_op12

\_gai

rw

sh\_op3\_

gai

rw

Res art rw

Res pfb rw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| sh\_op12\_gai | 7 | rw | **Shift of Current Sense Amplifier Gain 1,2**  1B Gain 2 active  0B Gain 1 active (default) |
| sh\_op3\_gai | 6 | rw | **fixed bit field for TLE9180 basic**  0B fixed value for TLE9180 basic |
| Res | 5:4 | none |  |
| art | 3:2 | rw | **fixed bit field for TLE9180 basic**  00B fixed value for TLE9180 basic |
| Res | 1 | none |  |
| pfb | 0 | rw | **Digital Phase Feedback Thresholds**  1B 80/20%  0B 50/50% (default) |

**No Operation**

|  |  |  |
| --- | --- | --- |
| **nop** | **Offset** | **Reset Value** |
| **No Operation** | **32H** | **0H** |

**CONFIDENTIAL**

**Register Specification**

7 6 5 4 3 2 1 0

nop

rw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| nop | 7:0 | rw | **No Operation**  00000000B default |

**1.1.3 Self\_test registers**

**Self Test Selection 1**

|  |  |  |
| --- | --- | --- |
| **Sel\_st\_1** | **Offset** | **Reset Value** |
| **Self Test Selection 1** | **35H** | **0H** |

7 6 5 4 3 2 1 0

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| st\_uv\_v cc | st\_scd\_  hs | st\_scd\_  ls | st\_uv\_c b | st\_uv\_b s | st\_hs | st\_ls | en\_clk\_  trim |

rw rw rw

rw rw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| st\_uv\_vcc | 7 | rw | **VCC Undervoltage Self Test**  1B Enable  0B Disable (default) |
| st\_scd\_hs | 6 | rw | **Short Circuit Detection at High-side Self Test**  1B Enable  0B Disable (default) |
| st\_scd\_ls | 5 | rw | **Short Circuit Detection at Low-side Self Test**  1B Enable  0B Disable (default) |
| st\_uv\_cb | 4 | rw | **CB Undervoltage Self Test**  1B Enable  0B Disable (default) |
| st\_uv\_bs | 3 | rw | **Bootstrap Capacitor Undervoltage Self Test**  1B Enable  0B Disable (default) |
| st\_hs | 2 | rwc | **fixed bit field for TLE9180 basic**  0B fixed value for TLE9180 basic |

**CONFIDENTIAL**

**Register Specification**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| st\_ls | 1 | rwc | **fixed bit field for TLE9180 basic**  0B fixed value for TLE9180 basic |
| en\_clk\_trim | 0 | rwc | **fixed bit field for TLE9180 basic**  0B fixed value for TLE9180 basic |

**Self Test Selection 2**

|  |  |  |
| --- | --- | --- |
| **Sel\_st\_2** | **Offset** | **Reset Value** |
| **Self Test Selection 2** | **36H** | **0H** |

7 6 5 4 3 2 1 0

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Res | en\_op3\_  gt2 | en\_op3\_  gt1 | en\_op2\_  gt2 | en\_op2\_  gt1 | en\_op1\_  gt2 | en\_op1\_  gt1 | en\_vreg  \_op |

rw rw

rw rw

rw rw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| Res | 7 | none |  |
| en\_op3\_gt2 | 6 | rw | **Current Sense Amplifier 3 - Gain 2 Test**  1B Enable  0B Disable (default) |
| en\_op3\_gt1 | 5 | rw | **Current Sense Amplifier 3 - Gain 1 Test**  1B Enable  0B Disable (default) |
| en\_op2\_gt2 | 4 | rw | **Current Sense Amplifier 2 - Gain 2 Test**  1B Enable  0B Disable (default) |
| en\_op2\_gt1 | 3 | rw | **Current Sense Amplifier 2 - Gain 1 Test**  1B Enable  0B Disable (default) |
| en\_op1\_gt2 | 2 | rw | **Current Sense Amplifier 1 - Gain 2 Test**  1B Enable  0B Disable (default) |
| en\_op1\_gt1 | 1 | rw | **Current Sense Amplifier 1 - Gain 1 Test**  1B Enable  0B Disable (default) |
| en\_vreg\_op | 0 | rwc | **Supply Voltage Measurement of Current Sense Amplifiers and**  **Reference Buffer**  1B Enable  0B Disable (default) |

**Self Test Mode Entry**

**CONFIDENTIAL**

**Register Specification**

|  |  |  |
| --- | --- | --- |
| **En\_st** | **Offset** | **Reset Value** |
| **Self Test Mode Entry** | **37H** | **80H** |

7 6 5 4 3 2 1 0

dis\_st

rw

Res en\_st

rw

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| dis\_st | 7 | rw | **Self Test Mode Disable**  1B Exit self test mode (default)  0B Enter self test mode |
| Res | 6:1 | none |  |
| en\_st | 0 | rw | **Self Test Mode Enable**  1B Enter self test mode  0B Exit self test mode (default) |

**1.1.4 Read registers**

**Operation Mode Overview**

|  |  |  |
| --- | --- | --- |
| **Om\_over** | **Offset** | **Reset Value** |
| **Operation Mode Overview** | **40H** | **0H** |

7 6 5 4 3 2 1 0

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| norm\_m | rect\_m | err\_m | soff\_m | self\_te st\_m | conf\_lo ck | conf\_m | idle\_m |

r r r r

r r r r

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| norm\_m | 7 | r | **Normal Operation Mode (Motor Driving Mode) Active**  1B In Driving Mode  0B Not in Driving Mode |
| rect\_m | 6 | r | **fixed bit field for TLE9180 basic**  0B fixed value for TLE9180 basic |
| err\_m | 5 | r | **Error Mode Active**  1B in Error Mode  0B Not in Error Mode |

**CONFIDENTIAL**

**Register Specification**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| soff\_m | 4 | r | **SOFF Mode Active**  1B In SOFF Mode  0B Not in SOFF Mode |
| self\_test\_m | 3 | r | **Self Test Mode Active**  1B in Self Test Mode  0B Not in Self Test Mode |
| conf\_lock | 2 | r | **Configuration Lock Mode Active**  1B In Configuration Lock Mode  0B Not in Configutation Lock Mode |
| conf\_m | 1 | r | **Configuration Mode Active**  1B In Configuration Mode  0B Not in Configuration Mode |
| idle\_m | 0 | r | **Idle Mode Active**  1B In Idle Mode  0B Not in Idle Mode |

**Error Overview**

|  |  |  |
| --- | --- | --- |
| **Err\_over** | **Offset** | **Reset Value** |
| **Error Overview** | **41H** | **0H** |

7 6 5 4 3 2 1 0

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| int12 | ext | outp | indiag | sd | scd | op | osf |

rc rc rc rc

rc rc rc rc

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| int12 | 7 | rc | **Internal Error**  1B Error set  0B No error |
| ext | 6 | rc | **External Error**  1B Error set  0B No error |
| outp | 5 | rc | **Output Pin Error**  1B Error set  0B No error |
| indiag | 4 | rc | **fixed bit field for TLE9180 basic**  0B fixed value for TLE9180 basic |
| sd | 3 | rc | **Shutdown Error**  1B Error set  0B No error |

**CONFIDENTIAL**

**Register Specification**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| scd | 2 | rc | **Short Circuit Error**  1B Error set  0B No error |
| op | 1 | rc | **Current Sense Amplifier Error**  1B Error set  0B No error |
| osf | 0 | rc | **fixed bit field for TLE9180 basic**  0B fixed value for TLE9180 basic |

**Special Event Register**

|  |  |  |
| --- | --- | --- |
| **Ser** | **Offset** | **Reset Value** |
| **Special Event Register** | **42H** | **0H** |

7 6 5 4 3 2 1 0

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| err\_ot\_  w | lfw | ctrl\_re g\_inval\* | gtm | apc\_act | st\_inco mplete | limp\_on | rom |

rc rc rc r

r rc r rc

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| err\_ot\_w | 7 | rc | **Overtemperature Detection**  1B Error set  0B No error |
| lfw | 6 | rc | **Latent Fault Warning**  Includes with OR: diag\_ADC\_stucked; 2 times (for pad IL2and pad IH1)  voltage regulator bypass schmitt trigger output;  1B Error set  0B No error |
| ctrl\_reg\_invali d | 5 | rc | **Error Correction of Control Register Failed**  1B Failed  0B No fail |
| gtm | 4 | r | **global test mode**  1B Entered  0B Not in global test mode |
| apc\_act | 3 | r | **fixed bit field for TLE9180 basic**  0B fixed value for TLE9180 basic |
| st\_incomplete | 2 | rc | **Self Test Incomplete**  1B Incomplete  0B Complete |
| limp\_on | 1 | r | **Limp Home Mode**  1B In Limp Home Mode  0B Not in Limp Home Mode (default) |

**CONFIDENTIAL**

**Register Specification**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| rom | 0 | rc | **Reduced Operation Mode has occured**  1B ROM occured  0B No ROM occured |

**Internal Errors 1**

|  |  |  |
| --- | --- | --- |
| **Err\_i\_1** | **Offset** | **Reset Value** |
| **Internal Errors 1** | **43H** | **0H** |

7 6 5 4 3 2 1 0

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| err\_clk  \_trim | err\_uv\_  cb | err\_uv\_  reg5 | err\_uv\_  reg6 | err\_ov\_  reg6 | err\_uv\_  reg4 | err\_uv\_  vcc\_rom | err\_ov\_  reg1 |

rc rc rc

rc rc

rc rc rc

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| err\_clk\_trim | 7 | rc | **Internal Clock Trimming Failed or Time-out**  1B Error set  0B No error |
| err\_uv\_cb | 6 | rc | **CB Undervoltage Detection Error**  1B Error set  0B No error |
| err\_uv\_reg5 | 5 | rc | **Undervoltage Internal Regulator 5 Error for Reduced Operation**  **Mode**  1B Error set  0B No error |
| err\_uv\_reg6 | 4 | rc | **Undervoltage Internal Regulator 6 Error**  1B Error set  0B No error |
| err\_ov\_reg6 | 3 | rc | **Overvoltage Internal Regulator 6 Error**  1B Error set  0B No error |
| err\_uv\_reg4 | 2 | rc | **Undervoltage Internal Regulator 4 Error**  1B Error set  0B No error |
| err\_uv\_vcc\_ro m | 1 | rc | **Undervoltage External VCC for Reduced Operation Mode**  1B Error set  0B No error |
| err\_ov\_reg1 | 0 | rc | **Overvoltage Internal Regulator 1 Error**  1B Error set  0B No error |

**CONFIDENTIAL**

**Register Specification**

**Internal Errors 2**

|  |  |  |
| --- | --- | --- |
| **Err\_i\_2** | **Offset** | **Reset Value** |
| **Internal Errors 2** | **44H** | **0H** |

7 6 5 4 3 2 1 0

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| err\_ov\_  bs1 | err\_ov\_  bs2 | err\_ov\_  bs3 | err\_cp1 | err\_cp2 | err\_uv\_  bs1 | err\_uv\_  bs2 | err\_uv\_  bs3 |

rc rc rc

rc rc

rc rc rc

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| err\_ov\_bs1 | 7 | rc | **Bootstrap Capacitor 1 Overvoltage Detection Error**  1B Error set  0B No error |
| err\_ov\_bs2 | 6 | rc | **Bootstrap Capacitor 2 Overvoltage Detection Error**  1B Error set  0B No error |
| err\_ov\_bs3 | 5 | rc | **Bootstrap Capacitor 3 Overvoltage Detection Error**  1B Error set  0B No error |
| err\_cp1 | 4 | rc | **Charge Pump 1 Overload Error**  1B Error set  0B No error |
| err\_cp2 | 3 | rc | **Charge Pump 2 Overload Error**  1B Error set  0B No error |
| err\_uv\_bs1 | 2 | rc | **Bootstrap Capacitor 1 Undervoltage Detection Error**  1B Error set  0B No error |
| err\_uv\_bs2 | 1 | rc | **Bootstrap Capacitor 2 Undervoltage Detection Error**  1B Error set  0B No error |
| err\_uv\_bs3 | 0 | rc | **Bootstrap Capacitor 3 Undervoltage Detection Error**  1B Error set  0B No error |

**External Errors**

|  |  |  |
| --- | --- | --- |
| **Err\_e** | **Offset** | **Reset Value** |
| **External Errors** | **45H** | **0H** |

**CONFIDENTIAL**

**Register Specification**

7 6 5 4 3 2 1 0

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Res | err\_ov\_  ld\_vdh | err\_ov\_  vcc | err\_uv\_  vcc | err\_uv\_  vs | err\_ov\_  vs | err\_uv\_  vdh | err\_ov\_  vdh |

rc rc rc

rc rc rc rc

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| Res | 7 | none |  |
| err\_ov\_ld\_vdh | 6 | rc | **Load Dump Detection CH2 at Pin VDH**  1B Error set  0B No error |
| err\_ov\_vcc | 5 | rc | **VCC Overvoltage Detection Error**  1B Error set  0B No error |
| err\_uv\_vcc | 4 | rc | **VCC Undervoltage Detection Error**  1B Error set  0B No error |
| err\_uv\_vs | 3 | rc | **Vs Undervoltage Detection Error**  1B Error set  0B No error |
| err\_ov\_vs | 2 | rc | **Vs Overvoltage Detection Error**  1B Error set  0B No error |
| err\_uv\_vdh | 1 | rc | **VDH Undervoltage Detection Error**  1B Error set  0B No error |
| err\_ov\_vdh | 0 | rc | **VDH Overvoltage Detection Error**  1B Error set  0B No error |

**Shutdown Errors**

|  |  |  |
| --- | --- | --- |
| **Err\_sd** | **Offset** | **Reset Value** |
| **Shutdown Errors** | **46H** | **0H** |

7 6 5 4 3 2 1 0

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| sd\_ot | sd\_ov\_v s | sd\_ov\_v dh | sd\_uv\_c b | sd\_clkf ail | sd\_ov\_c p | sd\_cp1 | sd\_ddp\_  stuck |

rc rc rc

rc rc

rc rc rc

**CONFIDENTIAL**

**Register Specification**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| sd\_ot | 7 | rc | **Overtemperature Shutdown**  1B Error set  0B No error |
| sd\_ov\_vs | 6 | rc | **Vs Overvoltage Shutdown**  1B Error set  0B No error |
| sd\_ov\_vdh | 5 | rc | **VDH Overvoltage Shutdown**  1B Error set  0B No error |
| sd\_uv\_cb | 4 | rc | **CB Undervoltage Shutdown**  1B Error set  0B No error |
| sd\_clkfail | 3 | rc | **Internal Clock Supervision Shutdown**  1B Error set  0B No error |
| sd\_ov\_cp | 2 | rc | **Charge Pump Overvoltage Shutdown at Pin CB or Pin CH2-CL2**  1B Error set  0B No error |
| sd\_cp1 | 1 | rc | **Vs Path Charge Pump Input Overload**  1B Error set  0B No error |
| sd\_ddp\_stuck | 0 | rc | **Digital Driving Path Stucked Shutdown**  1B Error set  0B No error |

**Short Circuit Errors**

|  |  |  |
| --- | --- | --- |
| **Err\_scd** | **Offset** | **Reset Value** |
| **Short Circuit Errors** | **47H** | **0H** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| err\_scd | err\_scd | err\_scd | err\_scd | err\_scd | err\_scd | R | s |
| \_hs1 | \_hs2 | \_hs3 | \_ls1 | \_ls2 | \_ls3 | e |  |
| rc | rc | rc | rc | rc | rc |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| err\_scd\_hs1 | 7 | rc | **Short Circuit at High-side 1**  1B Error set  0B No error |

**CONFIDENTIAL**

**Register Specification**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| err\_scd\_hs2 | 6 | rc | **Short Circuit at High-side 2**  1B Error set  0B No error |
| err\_scd\_hs3 | 5 | rc | **Short Circuit at High-side 3**  1B Error set  0B No error |
| err\_scd\_ls1 | 4 | rc | **Short Circuit at Low-side 1**  1B Error set  0B No error |
| err\_scd\_ls2 | 3 | rc | **Short Circuit at Low-side 2**  1B Error set  0B No error |
| err\_scd\_ls3 | 2 | rc | **Short Circuit at Low-side 3**  1B Error set  0B No error |
| Res | 1:0 | none |  |

**SPI Communication and Configuration Errors**

|  |  |  |
| --- | --- | --- |
| **Err\_spiconf** | **Offset** | **Reset Value** |
| **SPI Communication and Configuration Errors** | **4AH** | **0H** |

7 6 5 4 3 2 1 0

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Res | conf\_si g\_inval\* | conf\_to | spi\_add  \_invali\* | err\_spi  \_crc | err\_spi  \_wd | err\_spi  \_to | err\_spi  \_frame |

rc rc

rc rc

rc rc rc

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| Res | 7 | none |  |
| conf\_sig\_invali d | 6 | rc | **Configuration Signature Invalid**  1B Error set  0B No error |
| conf\_to | 5 | rc | **Configuration Time-Out**  1B Error set  0B No error |
| spi\_add\_invali d | 4 | rc | **Invalid Address Access**  1B Error set  0B No error |
| err\_spi\_crc | 3 | rc | **SPI CRC Error**  1B Error set  0B No error |

**CONFIDENTIAL**

**Register Specification**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| err\_spi\_wd | 2 | rc | **SPI watchdog Error**  1B Error set  0B No error |
| err\_spi\_to | 1 | rc | **SPI Time-out**  1B Error set  0B No error |
| err\_spi\_frame | 0 | rc | **SPI Frame Error**  1B Error set  0B No error |

**Current Sense Amplifiers 1 & 2 Errors**

|  |  |  |
| --- | --- | --- |
| **Err\_op\_12** | **Offset** | **Reset Value** |
| **Current Sense Amplifiers 1 & 2 Errors** | **4BH** | **0H** |

7 6 5 4 3 2 1 0

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| err\_op2  \_calib | err\_op2  \_ov | err\_op2  \_uv | err\_oc\_  op2 | err\_op1  \_calib | err\_op1  \_ov | err\_op1  \_uv | err\_oc\_  op1 |

rc rc rc rc rc

rc rc rc

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| err\_op2\_calib | 7 | rc | **Current Sense Amplifier 2 Calibration Failed**  1B Error set  0B No error |
| err\_op2\_ov | 6 | rc | **Current Sense Amplifier 2 Supply Overvoltage**  1B Error set  0B No error |
| err\_op2\_uv | 5 | rc | **Current Sense Amplifier 2 Supply Undervoltage**  1B Error set  0B No error |
| err\_oc\_op2 | 4 | rc | **Current Sense Amplifier 2 Overcurrent**  1B Error set  0B No error |
| err\_op1\_calib | 3 | rc | **Current Sense Amplifier 1 Calibration Failed**  1B Error set  0B No error |
| err\_op1\_ov | 2 | rc | **Current Sense Amplifier 1 and VRO Buffer Supply Overvoltage**  1B Error set  0B No error |
| err\_op1\_uv | 1 | rc | **Current Sense Amplifier 1 and VRO Buffer Supply Undervoltage**  1B Error set  0B No error |

**CONFIDENTIAL**

**Register Specification**

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| err\_oc\_op1 | 0 | rc | **Current Sense Amplifier 1 Overcurrent**  1B Error set  0B No error |

**Digital Output Pin Errors**

|  |  |  |
| --- | --- | --- |
| **Err\_outp** | **Offset** | **Reset Value** |
| **Digital Output Pin Errors** | **4DH** | **0H** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|  | Res |  | err\_out p\_PFB3 | err\_out p\_PFB2 | err\_out p\_PFB1 | err\_out p\_miso | err\_out p\_errn |
|  |  |  | rc | rc | rc | rc | rc |

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| Res | 7:5 | none |  |
| err\_outp\_PFB  3 | 4 | rc | **PFB3 Pin Shorted**  1B Error set  0B No error |
| err\_outp\_PFB  2 | 3 | rc | **PFB2 Pin Shorted**  1B Error set  0B No error |
| err\_outp\_PFB  1 | 2 | rc | **PFB1 Pin Shorted**  1B Error set  0B No error |
| err\_outp\_miso | 1 | rc | **MISO Pin Shorted**  1B Error set  0B No error |
| err\_outp\_errn | 0 | rc | **ERR\_N Pin Shorted**  1B Error set  0B No error |

**Low-side 1 Output Stage Temperature**

|  |  |  |
| --- | --- | --- |
| **temp\_ls1** | **Offset** | **Reset Value** |
| **Low-side 1 Output Stage Temperature** | **5AH** | **0H** |

**CONFIDENTIAL**

**Register Specification**

7 6 5 4 3 2 1 0

temp\_ls1 r

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Bits** | **Type** | **Description** |
| temp\_ls1 | 7:0 | r | **Low-side 1 Output Stage Temperature**  [formula: value\*2.74\*1.215/1.2/255; unit: Volt]  11111111B 2.774V - Maximum value  00000000B 0V - Minimum value |