



## ABSOLUTE MAXIMUM RATINGS

| Characteristic                                 | Symbol         | Value              | Unit          |
|------------------------------------------------|----------------|--------------------|---------------|
| Drain-source (GND) voltage <sup>(1)</sup>      | $V_{DSS}$      | 650                | V             |
| Drain-Gate voltage ( $R_{GS}=1M\Omega$ )       | $V_{DGR}$      | 650                | V             |
| Gate-source (GND) voltage                      | $V_{GS}$       | $\pm 30$           | V             |
| Drain current pulsed <sup>(2)</sup>            | $I_{DM}$       | 28.0               | $A_{DC}$      |
| Single pulsed avalanche energy <sup>(3)</sup>  | $E_{AS}$       | 570                | mJ            |
| Avalanche current <sup>(4)</sup>               | $I_{AS}$       | 20                 | A             |
| Continuous drain current ( $T_C=25^\circ C$ )  | $I_D$          | 7.0                | $A_{DC}$      |
| Continuous drain current ( $T_C=100^\circ C$ ) | $I_D$          | 5.6                | $A_{DC}$      |
| Supply voltage                                 | $V_{CC}$       | 30                 | V             |
| Analog input voltage range                     | $V_{FB}$       | $-0.3$ to $V_{SD}$ | V             |
| Total power dissipation                        | $P_D$ (wt H/S) | 135                | W             |
|                                                | Derating       | 1.1                | W/ $^\circ C$ |
| Operating temperature                          | $T_{OPR}$      | $-25$ to $+85$     | $^\circ C$    |
| Storage temperature                            | $T_{STG}$      | $-55$ to $+150$    | $^\circ C$    |

## NOTES:

1.  $T_j=25^\circ C$  to  $150^\circ C$
2. Repetitive rating: Pulse width limited by maximum junction temperature
3.  $L=24mH$ , starting  $T_j=25^\circ C$
4.  $L=13uH$ , starting  $T_j=25^\circ C$

## ELECTRICAL CHARACTERISTICS (SFET part)

(Ta=25°C unless otherwise specified)

| Characteristic                                      | Symbol       | Test condition                                                                                                          | Min. | Typ. | Max. | Unit     |
|-----------------------------------------------------|--------------|-------------------------------------------------------------------------------------------------------------------------|------|------|------|----------|
| Drain-source breakdown voltage                      | $BV_{DSS}$   | $V_{GS}=0V, I_D=50\mu A$                                                                                                | 650  | –    | –    | V        |
| Zero gate voltage drain current                     | $I_{DSS}$    | $V_{DS}=\text{Max.}, \text{Rating}, V_{GS}=0V$                                                                          | –    | –    | 200  | $\mu A$  |
|                                                     |              | $V_{DS}=0.8\text{Max.}, \text{Rating}, V_{GS}=0V, T_C=125^\circ C$                                                      | –    | –    | 500  | $\mu A$  |
| Static drain-source on resistance <sup>(note)</sup> | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=4.0A$                                                                                                  | –    | 1.25 | 1.6  | $\Omega$ |
| Forward transconductance <sup>(note)</sup>          | $g_{fs}$     | $V_{DS}=15V, I_D=4.0A$                                                                                                  | 3.0  | –    | –    | S        |
| Input capacitance                                   | $C_{iss}$    | $V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$                                                                                  | –    | 1600 | –    | pF       |
| Output capacitance                                  | $C_{oss}$    |                                                                                                                         | –    | 310  | –    |          |
| Reverse transfer capacitance                        | $C_{rss}$    |                                                                                                                         | –    | 120  | –    |          |
| Turn on delay time                                  | $t_{d(on)}$  | $V_{DD}=0.5BV_{DSS}, I_D=7.0A$<br>(MOSFET switching time are essentially independent of operating temperature)          | –    | 25   | –    | nS       |
| Rise time                                           | $t_r$        |                                                                                                                         | –    | 55   | –    |          |
| Turn off delay time                                 | $t_{d(off)}$ |                                                                                                                         | –    | 80   | –    |          |
| Fall time                                           | $t_f$        |                                                                                                                         | –    | 50   | –    |          |
| Total gate charge (gate-source+gate-drain)          | $Q_g$        | $V_{GS}=10V, I_D=7.0A, V_{DS}=0.5BV_{DSS}$ (MOSFET switching time are essentially independent of operating temperature) | –    | –    | 72   | nC       |
| Gate-source charge                                  | $Q_{gs}$     |                                                                                                                         | –    | 9.3  | –    |          |
| Gate-drain (Miller) charge                          | $Q_{gd}$     |                                                                                                                         | –    | 29.3 | –    |          |

**NOTE:** Pulse test: Pulse width  $\leq 300\mu S$ , duty cycle  $\leq 2\%$

**ELECTRICAL CHARACTERISTICS (Control part)**

(Ta=25°C unless otherwise specified)

| Characteristic                               | Symbol              | Test condition                              | Min. | Typ. | Max. | Unit |
|----------------------------------------------|---------------------|---------------------------------------------|------|------|------|------|
| <b>SENSE FET SECTION</b>                     |                     |                                             |      |      |      |      |
| Drain to PKG Breakdown voltage               | BVpkg               | 60Hz AC, Ta=25°C                            | 3500 | –    | –    | V    |
| Drain to Source Breakdown voltage            | BVdss               | Vdrain=650V, Ta=25°C                        | 650  | –    | –    | V    |
| Drain to Source Leakage current              | Idss                | Vdrain=650V, Ta=25°C                        | –    | –    | 200  | μA   |
| <b>OSCILLATOR SECTION</b>                    |                     |                                             |      |      |      |      |
| Initial Frequency                            | F <sub>OSC</sub>    | –                                           | 18   | 20   | 22   | KHz  |
| Voltage Stability                            | F <sub>STABLE</sub> | 12≤V <sub>CC</sub> ≤23V                     | 0    | 1    | 3    | %    |
| Temperature Stability <sup>note 2</sup>      | ΔF <sub>OSC</sub>   | -25°C≤Ta≤85°C                               | 0    | ±5   | ±10  | %    |
| Maximum Duty Cycle                           | D <sub>MAX</sub>    | –                                           | 92   | 95   | 98   | %    |
| Minimum Duty Cycle                           | D <sub>MIN</sub>    | –                                           | –    | –    | 0    | %    |
| <b>UVLO SECTION</b>                          |                     |                                             |      |      |      |      |
| Start Threshold Voltage                      | V <sub>START</sub>  | V <sub>FB</sub> =GND                        | 14   | 15   | 16   | V    |
| Stop Threshold Voltage                       | V <sub>STOP</sub>   | V <sub>FB</sub> =GND                        | 8    | 9    | 10   | V    |
| <b>FEEDBACK SECTION</b>                      |                     |                                             |      |      |      |      |
| Feedback Source Current                      | I <sub>FB</sub>     | V <sub>FB</sub> =GND                        | 0.7  | 0.9  | 1.1  | mA   |
| Shutdown Feedback Voltage                    | V <sub>SD</sub>     | V <sub>fb</sub> ≥6.9V                       | 6.9  | 7.5  | 8.1  | V    |
| Shutdown Delay Current                       | I <sub>DELAY</sub>  | V <sub>FB</sub> =5V                         | 4    | 5    | 6    | μA   |
| <b>PROTECTION SECTION</b>                    |                     |                                             |      |      |      |      |
| Over Current Protection                      | V <sub>OVP</sub>    | V <sub>sync</sub> ≥11V                      | 11   | 12   | 13   | V    |
| Over Current Latch Voltage <sup>note 2</sup> | V <sub>OCL</sub>    | –                                           | 0.9  | 1.0  | 1.1  | V    |
| Thermal shutdown Temp.                       | TSD                 | –                                           | 140  | 160  | –    | °C   |
| <b>SYNC SECTION</b>                          |                     |                                             |      |      |      |      |
| Normal Sync High Threshold Voltage           | V <sub>NSH</sub>    | V <sub>CC</sub> =16V, V <sub>fb</sub> =5V   | 4.0  | 4.6  | 5.2  | V    |
| Normal Sync Low Threshold Voltage            | V <sub>NSL</sub>    | V <sub>CC</sub> =16V, V <sub>fb</sub> =5V   | 2.3  | 2.6  | 2.9  | V    |
| Burst High Threshold Voltage                 | V <sub>BSH</sub>    | V <sub>CC</sub> =10.5V, V <sub>fb</sub> =0V | 3.2  | 3.6  | 4.0  | V    |
| Burst Low Threshold Voltage                  | V <sub>BSL</sub>    | V <sub>CC</sub> =10.5V, V <sub>fb</sub> =0V | 1.1  | 1.3  | 1.5  | V    |

**ELECTRICAL CHARACTERISTICS (Continued)**

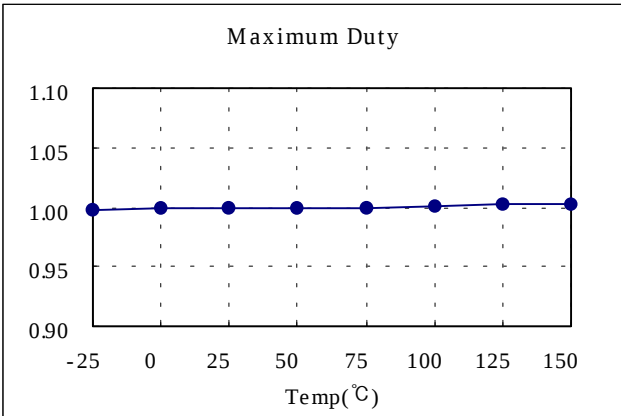
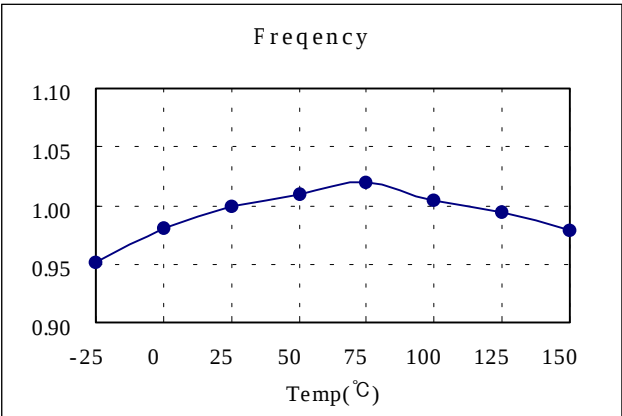
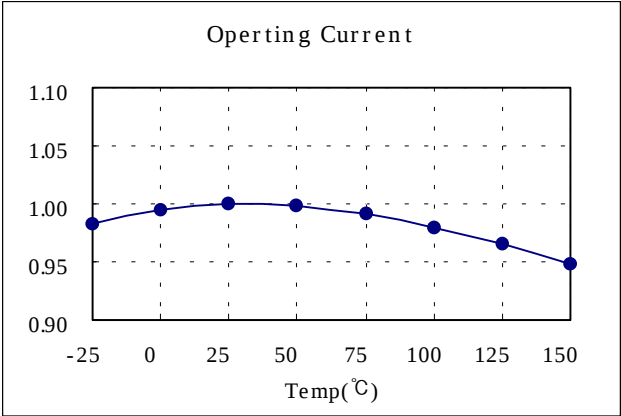
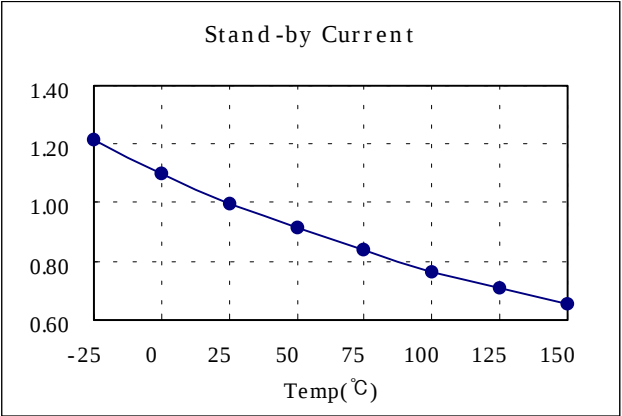
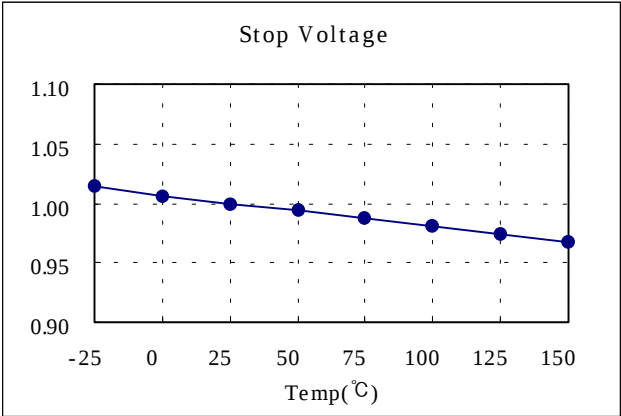
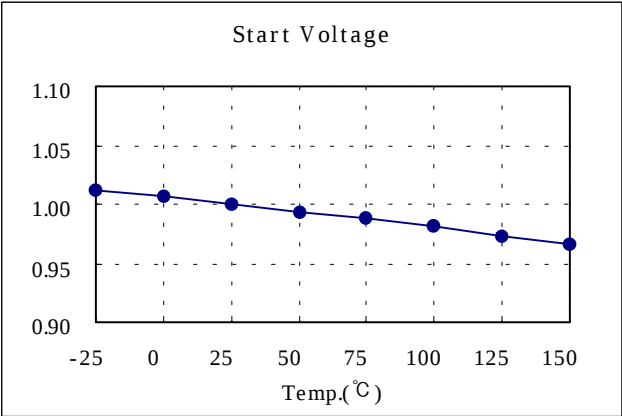
(Ta=25°C unless otherwise specified)

| Characteristic                                 | Symbol               | Test condition                 | Min. | Typ. | Max. | Unit |
|------------------------------------------------|----------------------|--------------------------------|------|------|------|------|
| <b>BURST MODE SECTION</b>                      |                      |                                |      |      |      |      |
| Burst mode Low Threshold Voltage               | V <sub>BURL</sub>    | Vfb=0V                         | 10.4 | 11.0 | 11.6 | V    |
| Burst mode High Threshold Voltage              | V <sub>BURH</sub>    | Vfb=0V                         | 11.4 | 12.0 | 12.6 | V    |
| Burst mode Enable Feedback voltage             | V <sub>BEN</sub>     | V <sub>CC</sub> =10.5V         | 0.7  | 1.0  | 1.3  | V    |
| Burst mode Peak Current Limit                  | I <sub>BU_PK</sub>   | V <sub>CC</sub> =10.5V         | 0.65 | 0.85 | 1.0  | V    |
| <b>PRIMARY SIDE REGULATION SECTION</b>         |                      |                                |      |      |      |      |
| Primary Regulation Threshold Voltage           | V <sub>PR</sub>      | I <sub>fb</sub> =700μA, Vfb=4V | 32.0 | 32.5 | 33.0 | V    |
| Primary Regulation Transconductance            | G <sub>PR</sub>      | –                              | 2.0  | 2.6  | –    | mA/V |
| <b>CURRENT LIMIT (SELF-PROTECTION) SECTION</b> |                      |                                |      |      |      |      |
| Peak Current Limit <sup>note 3</sup>           | I <sub>PK</sub>      | –                              | 4.4  | 5.0  | 5.6  | A    |
| <b>START UP CURRENT</b>                        |                      |                                |      |      |      |      |
| Start up Current                               | I <sub>START</sub>   | Vfb=GND, V <sub>CC</sub> =14V  | –    | 0.1  | 0.2  | mA   |
| Operatig Supply Current <sup>noet 1</sup>      | I <sub>OP</sub>      | Vfb=GND, V <sub>CC</sub> =16V  | –    | 10   | 18   | mA   |
|                                                | I <sub>OP(MIN)</sub> | Vfb=GND, V <sub>CC</sub> =12V  |      |      |      |      |
|                                                | I <sub>OP(MAX)</sub> | Vfb=GND, V <sub>CC</sub> =28V  |      |      |      |      |

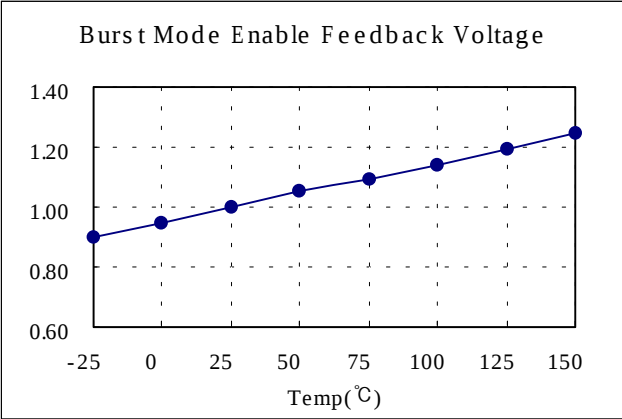
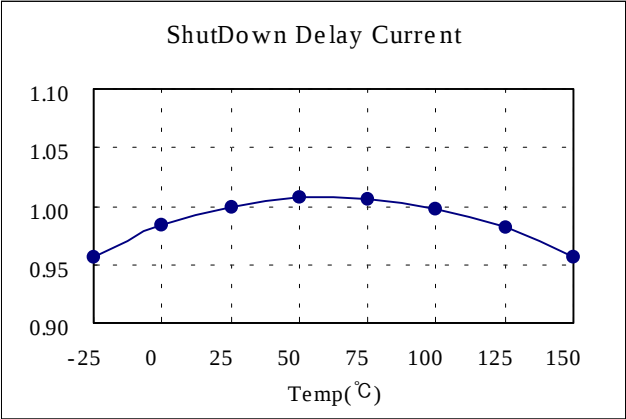
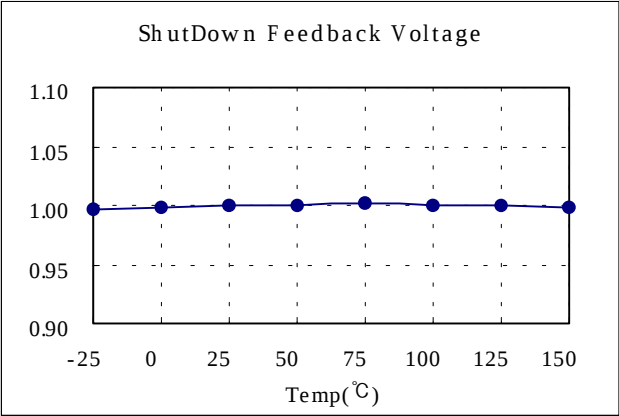
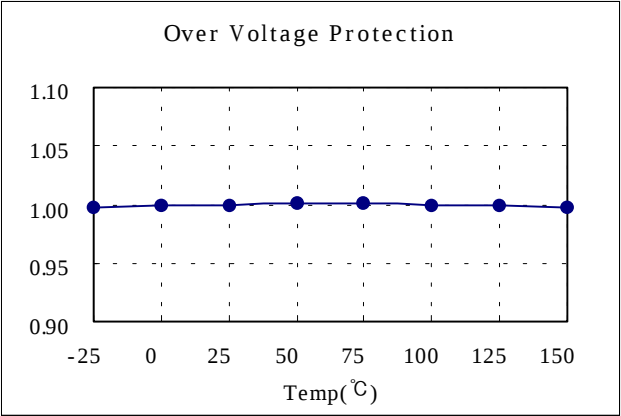
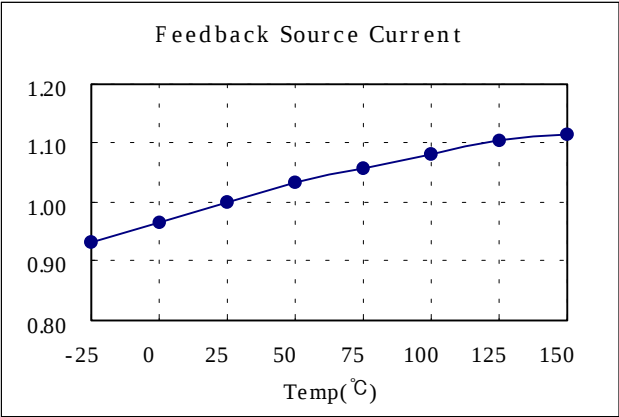
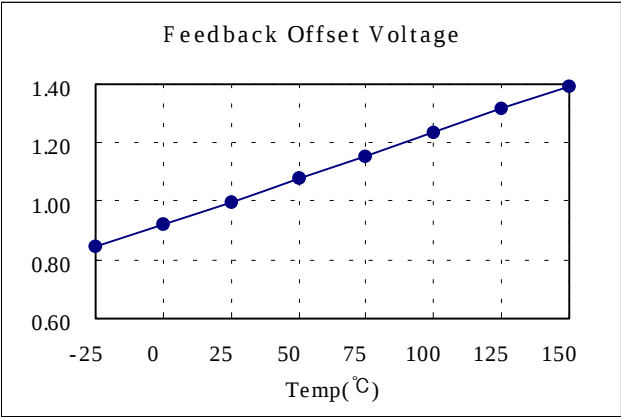
**NOTE:**

1. These parameters, although guaranteed, are not 100% tested in production
2. These parameters, although guaranteed, are tested in EDS (wafer test) process
3. These parameters indicate inductor current

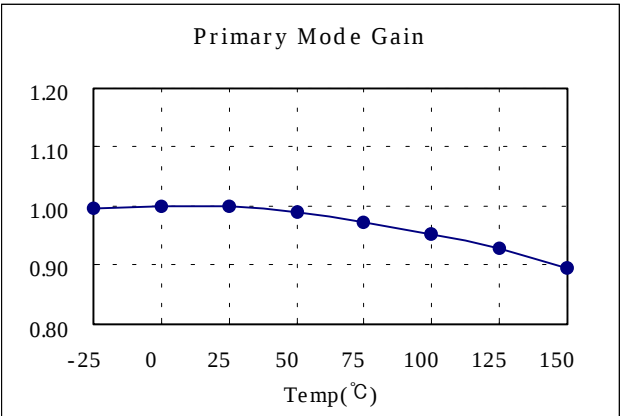
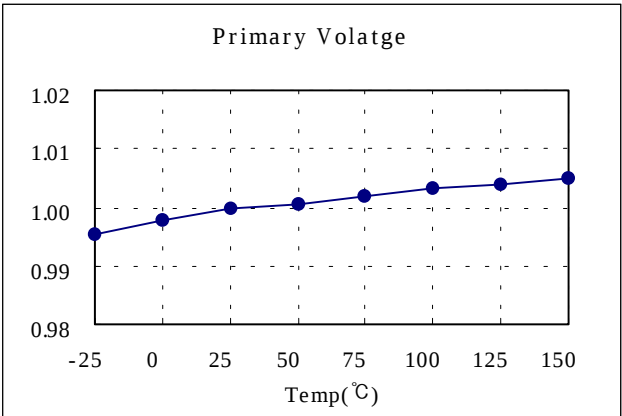
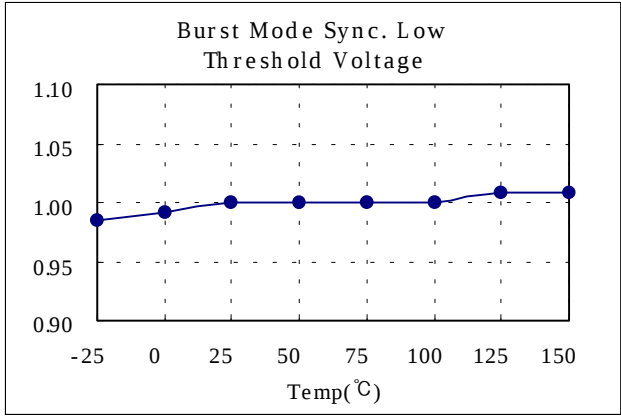
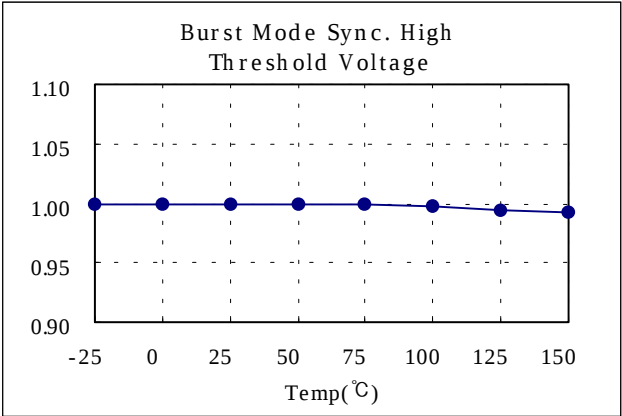
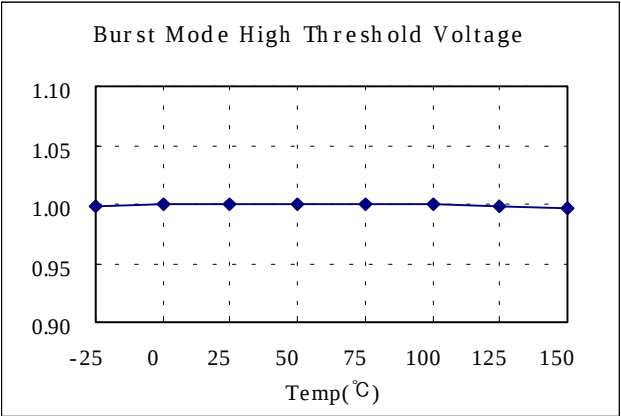
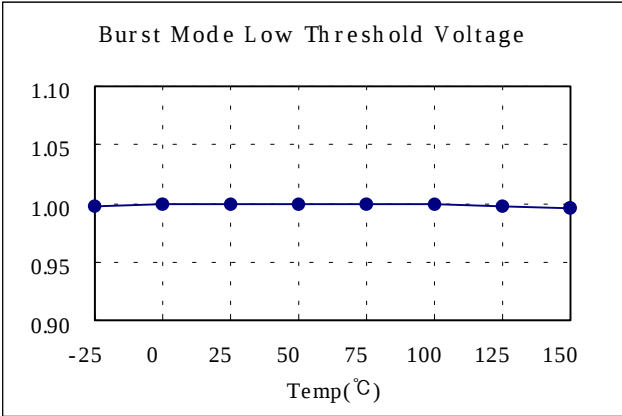
TYPICAL PERFORMANCE CHARACTERISTICS



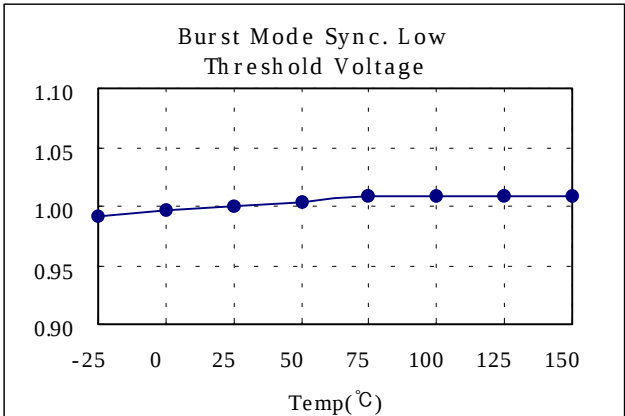
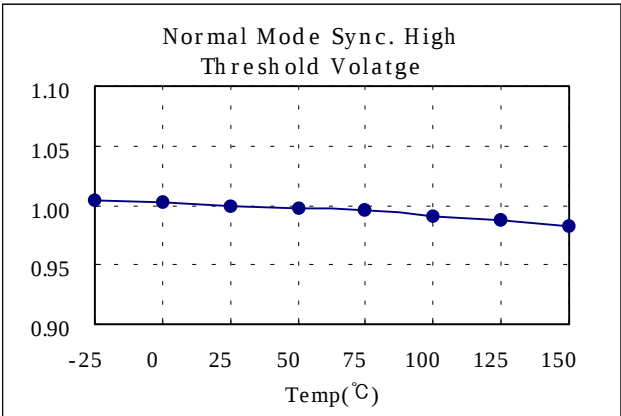
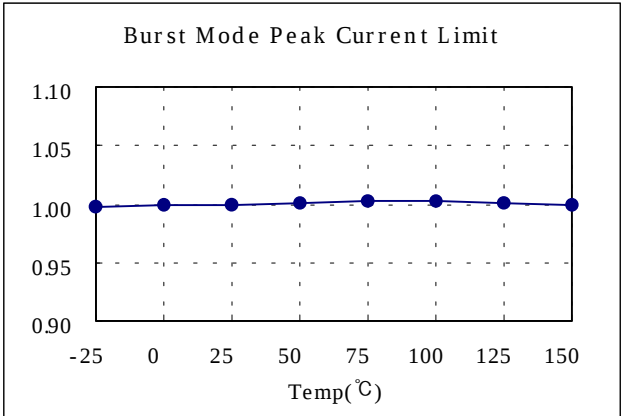
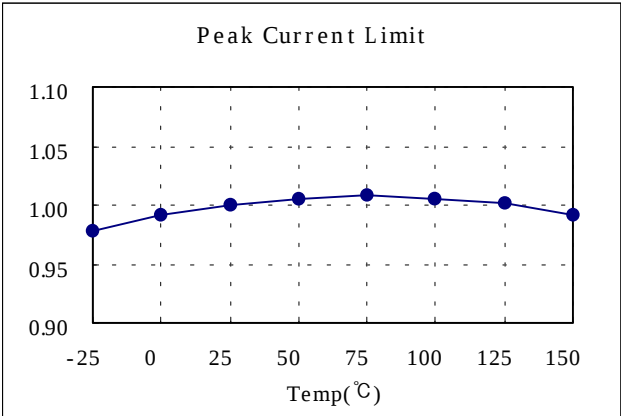
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)



TYPICAL PERFORMANCE CHARACTERISTICS (Continued)



TYPICAL PERFORMANCE CHARACTERISTICS (Continued)



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