

FMOSTHP180N03-H

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# FMOSTHP180N03-H

## 180A 30V N-Channel Trench Enhancement Mode Power MOSFET

### Features

- $V_{DS}=30V$ ,  $I_D=180A$ .
- $R_{DS(ON)} \leq 3.5m\Omega$ , @  $V_{GS}=10V$ ,  $I_D=40A$ .
- $R_{DS(ON)} \leq 4.5m\Omega$ , @  $V_{GS}=4.5V$ ,  $I_D=30A$ .
- Excellent on-resistance and low gate charge.
- Advanced trench technology.
- Lead-free parts meet RoHS requirements.
- Halogen-free (IEC61249-2-21).

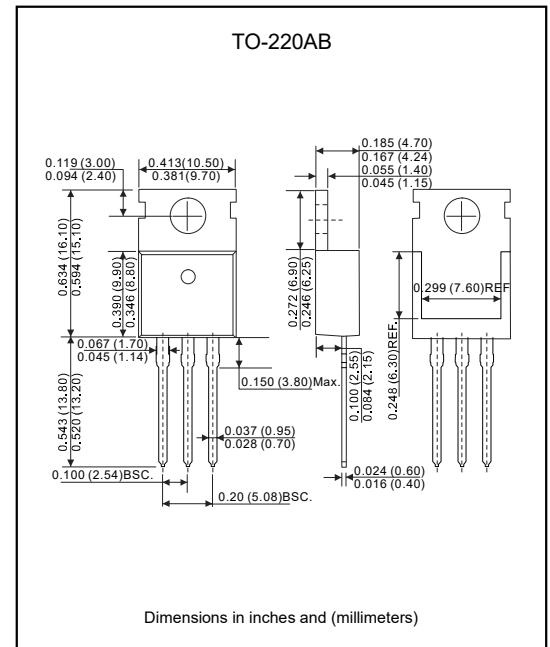
### Application

- Load switch.
- PWM application.
- Power management.

### Mechanical data

- Epoxy:UL94-V0 rated flame retardant.
- Case : Molded plastic, TO-220AB.
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026.
- Weight : Approximated 1.93g.

### Package outline



### Maximum ratings (At $T_J=25^\circ C$ unless otherwise specified)

| Parameter                                       | Symbol          | Ratings     | Unit         |
|-------------------------------------------------|-----------------|-------------|--------------|
| Drain to source voltage                         | $V_{DS}$        | 30          | V            |
| Gate to source voltage                          | $V_{GS}$        | $\pm 20$    | V            |
| Continuous drain current                        | $I_D$           | 180         | A            |
|                                                 |                 | 114         |              |
| Pulsed drain current (Note 1)                   | $I_{DM}$        | 720         | A            |
| Single pulse avalanche energy (Note 2)          | $E_{AS}$        | 306         | mJ           |
| Power dissipation                               | $P_D$           | 129         | W            |
| Thermal resistance-junction to ambient (Note 3) | $R_{\theta JA}$ | 56          | $^\circ C/W$ |
| Thermal resistance-junction to case             | $R_{\theta JC}$ | 1.4         | $^\circ C/W$ |
| Junction temperature                            | $T_J$           | +175        | $^\circ C$   |
| Storage temperature range                       | $T_{STG}$       | -55 to +175 | $^\circ C$   |

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**Electrical characteristics** (At  $T_J=25^{\circ}\text{C}$  unless otherwise specified)

| Parameter                      | Symbol    | Conditions                                                          | Min. | Typ. | Max.      | Unit          |
|--------------------------------|-----------|---------------------------------------------------------------------|------|------|-----------|---------------|
| <b>Off characteristics</b>     |           |                                                                     |      |      |           |               |
| Drain-source breakdown voltage | $BV_{DS}$ | $I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$                           | 30   |      |           | V             |
| Drain-source leakage current   | $I_{DSS}$ | $V_{DS}=30\text{V}$ , $V_{GS}=0\text{V}$ , $T_J=25^{\circ}\text{C}$ |      |      | 1         | $\mu\text{A}$ |
| Gate-source leakage current    | $I_{GSS}$ | $V_{GS}=\pm 20\text{V}$ , $V_{DS}=0\text{V}$                        |      |      | $\pm 100$ | nA            |

**On characteristics**

|                                                 |              |                                         |     |     |     |            |
|-------------------------------------------------|--------------|-----------------------------------------|-----|-----|-----|------------|
| Gate threshold voltage                          | $V_{GS(TH)}$ | $V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$  | 1.3 | 1.9 | 2.5 | V          |
| Static drain-source on-state resistance (Note4) | $R_{DS(ON)}$ | $V_{GS}=10\text{V}$ , $I_D=40\text{A}$  |     | 2.5 | 3.5 | m $\Omega$ |
|                                                 |              | $V_{GS}=4.5\text{V}$ , $I_D=32\text{A}$ |     | 3.5 | 4.5 |            |

**Dynamic parameters**

|                              |           |                                                              |  |      |  |    |
|------------------------------|-----------|--------------------------------------------------------------|--|------|--|----|
| Input capacitance            | $C_{iss}$ | $V_{GS}=0\text{V}$ , $V_{DS}=50\text{V}$ , $f=1.0\text{MHz}$ |  | 5065 |  | pF |
| Out capacitance              | $C_{oss}$ |                                                              |  | 574  |  |    |
| Reverse transfer capacitance | $C_{rss}$ |                                                              |  | 472  |  |    |

**Switching parameters**

|                       |              |                                                                                 |  |    |  |    |
|-----------------------|--------------|---------------------------------------------------------------------------------|--|----|--|----|
| Total gate charge     | $Q_g$        | $V_{GS}=10\text{V}$ , $V_{DS}=15\text{V}$ , $I_D=30\text{A}$                    |  | 97 |  | nC |
| Gate to source charge | $Q_{gs}$     |                                                                                 |  | 20 |  |    |
| Gate to drain charge  | $Q_{gd}$     |                                                                                 |  | 23 |  |    |
| Turn-on delay time    | $t_{d(on)}$  | $V_{DD}=15\text{V}$ , $V_{GS}=10\text{V}$ , $I_D=30\text{A}$ ,<br>$R_G=3\Omega$ |  | 16 |  | ns |
| Rise time             | $t_r$        |                                                                                 |  | 30 |  |    |
| Turn-off delay time   | $t_{d(off)}$ |                                                                                 |  | 54 |  |    |
| Fall time             | $t_f$        |                                                                                 |  | 19 |  |    |

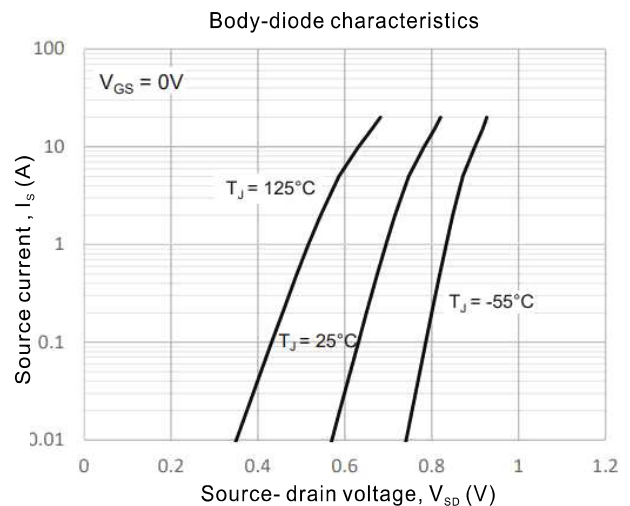
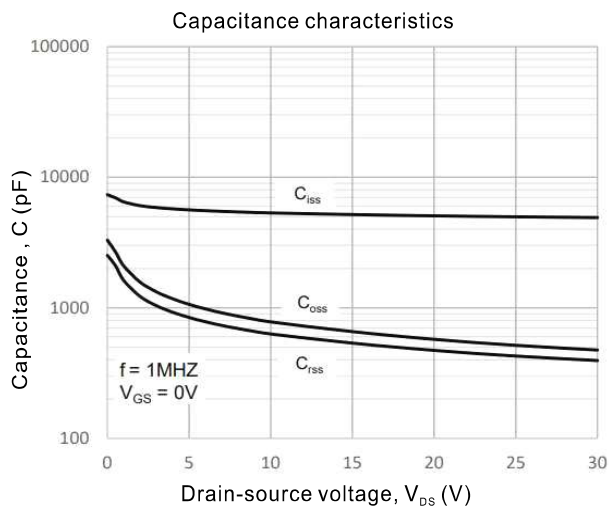
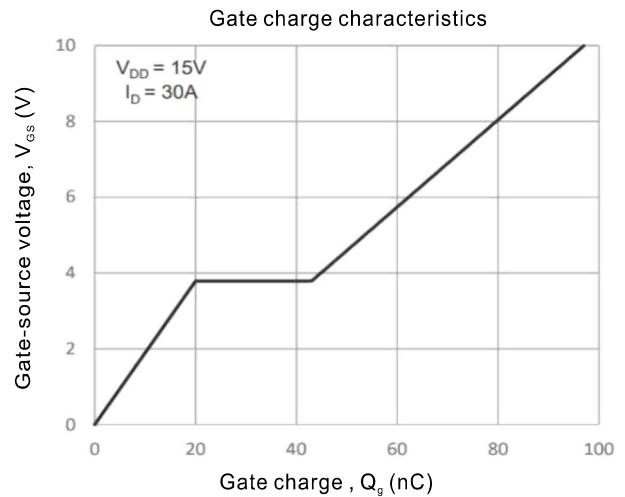
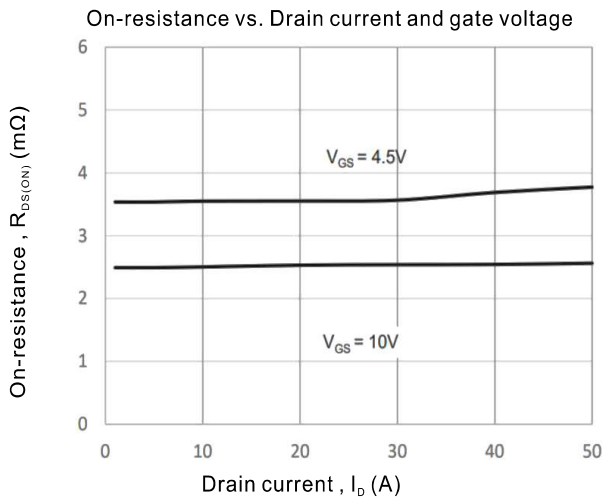
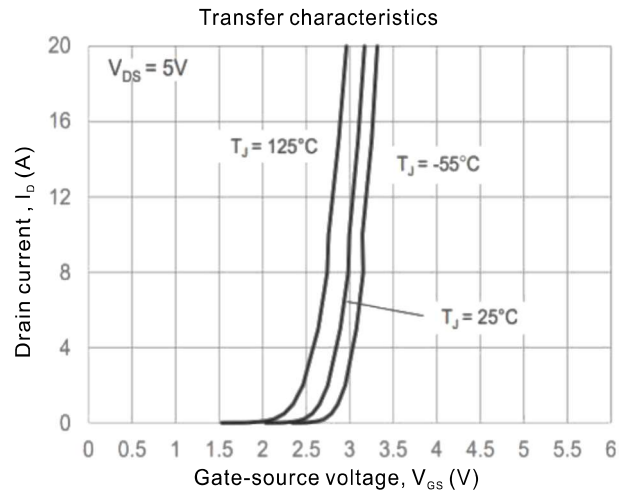
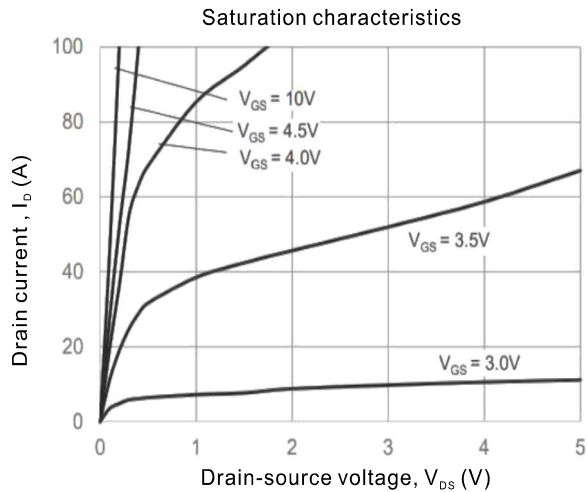
**Source-drain diode ratings and characteristics**

|                         |          |                                                                             |  |    |     |    |
|-------------------------|----------|-----------------------------------------------------------------------------|--|----|-----|----|
| Diode Forward Voltage   | $V_{SD}$ | $I_S=30\text{A}$ , $V_{GS}=0\text{V}$                                       |  |    | 1.2 | V  |
| Reverse recovery time   | $t_{rr}$ | $I_S=30\text{A}$ , $V_{GS}=0\text{V}$ ,<br>$diF/dt=100\text{A}/\mu\text{s}$ |  | 23 |     | ns |
| Reverse recovery charge | $Q_{rr}$ |                                                                             |  | 14 |     | nC |

Note: 1.Repetitive rating: Pulse width limited by maximum junction temperature.  
2. $E_{AS}$  condition: starting  $T_J=25^{\circ}\text{C}$ ,  $V_{DD}=15\text{V}$ ,  $V_G=10\text{V}$ ,  $R_G=25\Omega$ ,  $L=0.5\text{mH}$ ,  $I_{AS}=34\text{A}$ .  
3. $R_{\theta JA}$  is measured with the device mounted on a 1 inch<sup>2</sup> pad of 2oz copper FR4 PCB.  
4.Pulse test: pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 0.5\%$ .

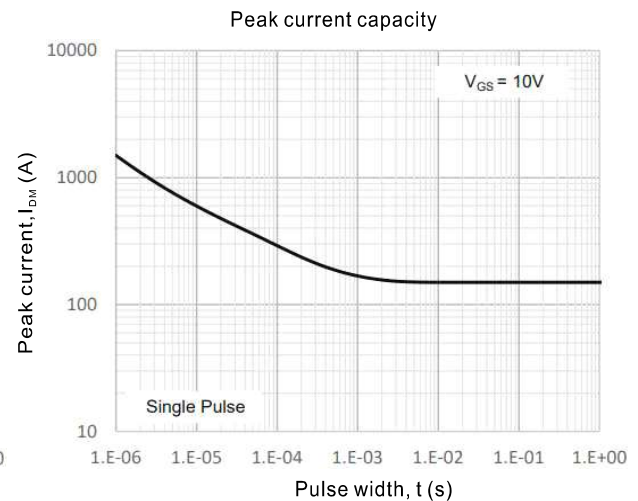
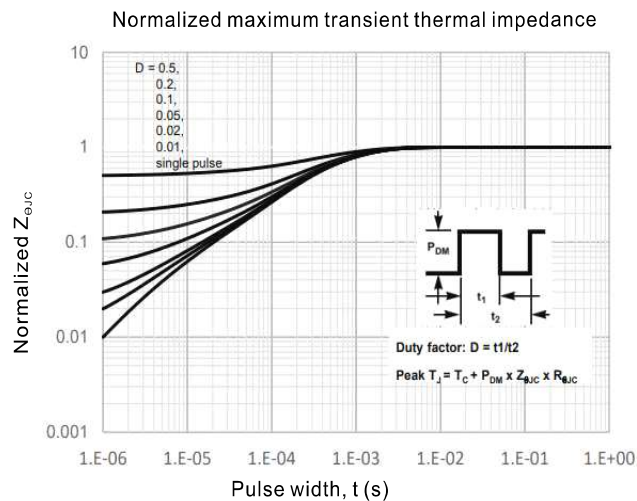
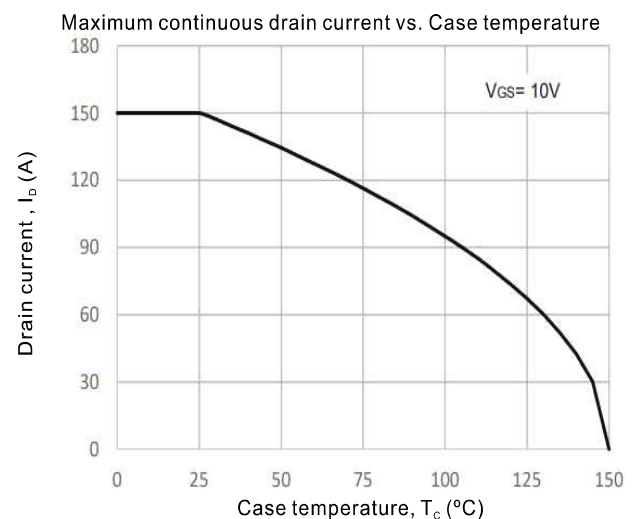
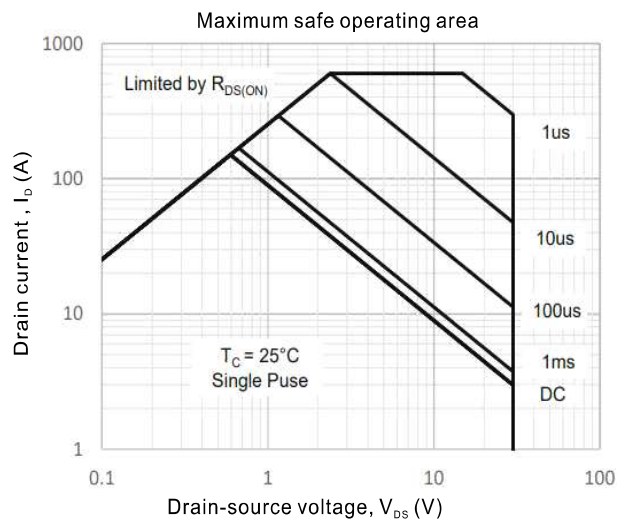
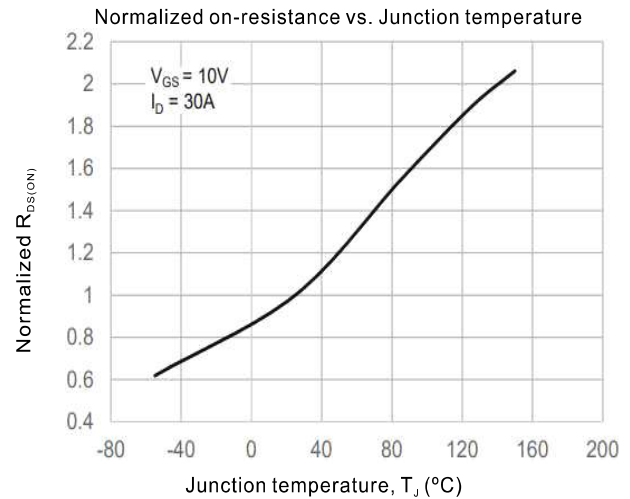
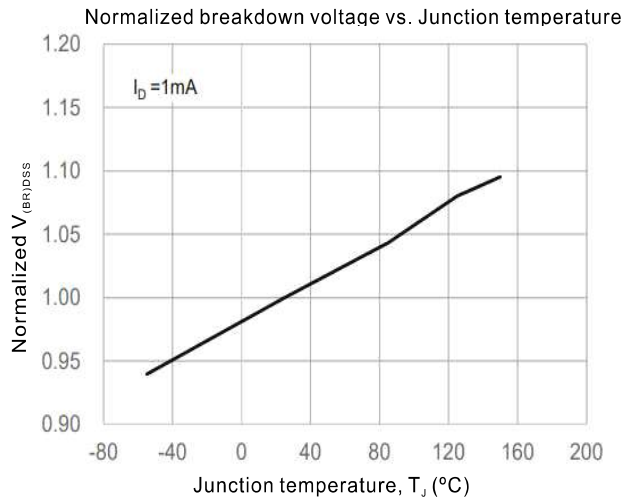
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## Rating and characteristic curves



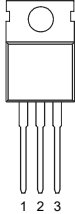
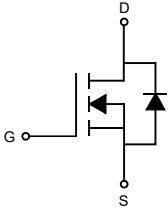
## FMOSTHP180N03-H

## Rating and characteristic curves



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Pinning information

| Pin                                       | Simplified outline                                                                | Symbol                                                                              |
|-------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Pin 1 Gate<br>Pin 2 Drain<br>Pin 3 Source |  |  |

Marking

| Type number     | Marking code      |
|-----------------|-------------------|
| FMOSTHP180N03-H | PSW3030A<br>YYWWX |

\*YYWW: Wafer Lot code.  
Y: Year  
WW: Week  
X: Assy. code

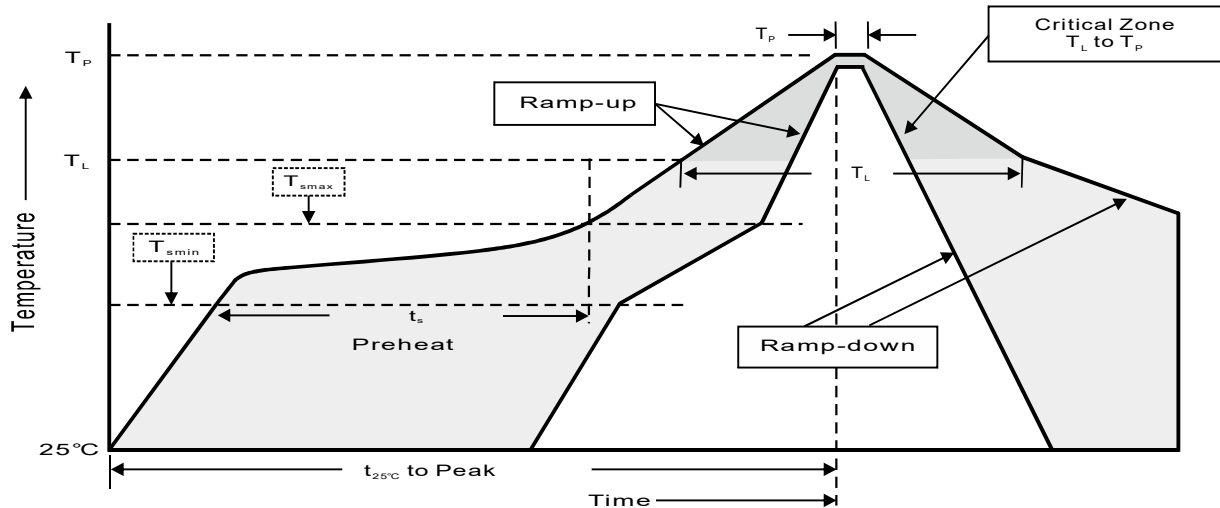
Packing Information

| Device          | PACKAGE  | Outline | Tube (pcs) | BOX (pcs) | INNER BOX (m/m) | CARTON SIZE (m/m) | CARTON (pcs) |
|-----------------|----------|---------|------------|-----------|-----------------|-------------------|--------------|
| FMOSTHP180N03-H | TO-220AB | Tube    | 50         | 2,000     | 550*167*75      | 570*345*170       | 8,000        |

## FMOSTHP180N03-H

## Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature = 5°C ~ 40°C Humidity = 55%, ±25%
- 2.Reflow soldering of surface-mount devices



## 3.Reflow soldering

| Profile feature                                                                                                  | Soldering condition            |
|------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Average ramp-up rate ( $T_L$ to $T_p$ )                                                                          | < 3 °C/sec                     |
| Preheat<br>- Temperature Min ( $T_{smin}$ )<br>- Temperature Max ( $T_{smax}$ )<br>- Time (Min to Max) ( $t_s$ ) | 150°C<br>200°C<br>60 ~ 120 sec |
| $T_{smax}$ to $T_L$<br>- Ramp-up rate                                                                            | < 3 °C/sec                     |
| Time maintained above :<br>- Temperature ( $T_L$ )<br>- Time ( $T_L$ )                                           | 217°C<br>60 ~ 260 sec          |
| Peak temperature ( $T_p$ )                                                                                       | 255 °C -0/+5°C                 |
| Time with 5°C of actual peak temperature ( $T_p$ )                                                               | 10 ~30 sec                     |
| Ramp-down rate                                                                                                   | < 6 °C/sec                     |
| Time 25°C to peak temperature                                                                                    | < 6 minutes                    |