

FMOSM21N06

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FMOSM21N06

21A 60V N-Channel Enhancement Mode Power MOSFET

Features

- $V_{DS}=60V$, $I_D = 21A$
- $R_{DS(ON)} \leq 12.8\text{ m}\Omega$ @ $V_{GS}=10V$, $I_D=20A$
- $R_{DS(ON)} \leq 16.3\text{ m}\Omega$ @ $V_{GS}=4.5V$, $I_D=15A$
- Low on-resistance and low gate charge
- 100% UIS and R_g tested
- Lead-free parts meet RoHS requirements
- Suffix "-H" indicates Halogen-free part, ex.FMOSM21N06-H

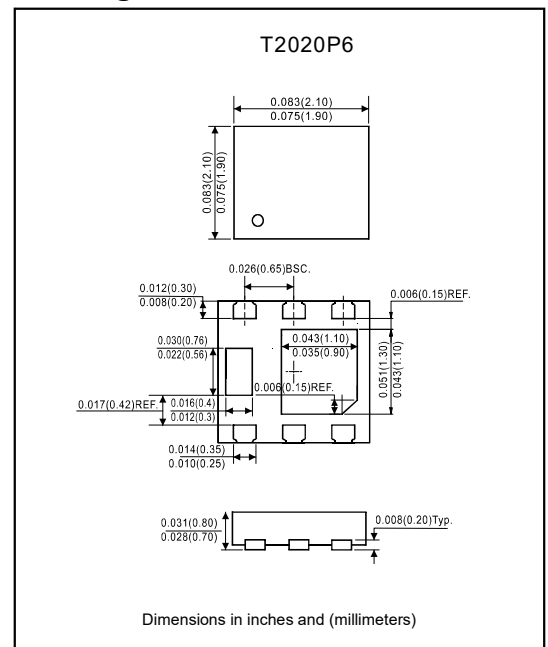
Applications

- Power Management in Computing, CE, IE 4.0, Communications
- Current Switching in DC/DC & AC/DC (SR) Sub-systems
- Load Switching, Quick/Wireless Charging, Motor Driving

Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, T2020P6
- Terminals:Solder plated,solderable per MIL-STD-750,Method 2026
- Mounting Position : Any

Package outline



Maximum ratings (At $T_A=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Ratings	Unit
Drain-source voltage	V_{DS}	60	V
Gate-source voltage	V_{GS}	± 20	
Continuous drain current (Note 1)	I_D	21	A
		17	
Pulse drain current tested (Note 2)	I_{DM}	83	A
Avalanche current (Note 3)	I_{AS}	20	A
Avalanche energy (Note 3)	E_{AS}	20	mJ
Maximum power dissipation (Note 4)	P_D	9.6	W
		6.2	
Thermal resistance, junction to ambient	$R_{\theta JA}$	80	$^\circ\text{C/W}$
Thermal resistance, junction to case	$R_{\theta JC}$	13	$^\circ\text{C/W}$
Operating junction temperature	T_J	+150	$^\circ\text{C}$
Storage temperature range	T_{STG}	-55 to +150	$^\circ\text{C}$

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	60			V
Drain-source leakage current	I_{DSS}	$V_{DS}=48\text{V}$, $V_{GS}=0\text{V}$			1.0	μA
		$V_{DS}=48\text{V}$, $V_{GS}=0\text{V}$, $T_J=55^\circ\text{C}$			5.0	
Gate-source leakage current	I_{GSS}	$V_{GS}=\pm 20\text{V}$, $V_{DS}=0\text{V}$			± 100	nA

On characteristics

Gate threshold voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1.2	1.6	2.5	V
Static drain-source on-state resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=20\text{A}$		9.8	12.8	m Ω
		$V_{GS}=4.5\text{V}$, $I_D=15\text{A}$		12.5	16.3	m Ω
Forward transconductance	g_{FS}	$V_{DS}=5\text{V}$, $I_D=20\text{A}$		81		S

Dynamic parameters (Note 5)

Input capacitance	C_{iss}	$V_{GS}=0\text{V}$, $V_{DS}=30\text{V}$, $f=1.0\text{MHz}$		731		pF
Out capacitance	C_{oss}			224		
Reverse transfer capacitance	C_{rss}			7.4		
Gate resistance	R_G	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1.0\text{MHz}$		2.4		Ω

Switching parameters (Note 5)

Total gate charge	Q_g	$V_{GS}=10\text{V}$, $V_{DS}=30\text{V}$, $I_D=20\text{A}$		13.9		nC
Total gate charge		$V_{GS}=4.5\text{V}$, $V_{DS}=30\text{V}$, $I_D=20\text{A}$		7.0		
Gate to source charge	Q_{gs}	$V_{GS}=0$ to 10V , $V_{DS}=30\text{V}$, $I_D=20\text{A}$		1.6		
Gate to drain charge	Q_{gd}			3.1		
Turn-on delay time	$t_{d(on)}$	$V_{DS}=30\text{V}$, $V_{GS}=10\text{V}$, $R_G=6\Omega$, $R_L=1.5\Omega$		3.7		ns
Rise time	t_r			4.3		
Turn-off delay time	$t_{d(off)}$			16.2		
Fall time	t_f			6.5		

Source-drain diode ratings and characteristics (Note 5)

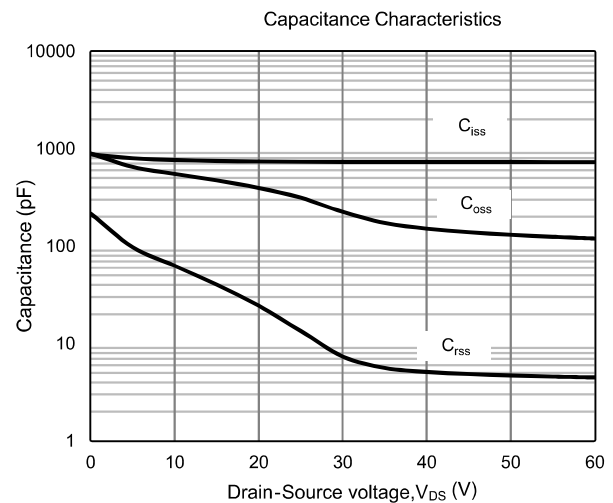
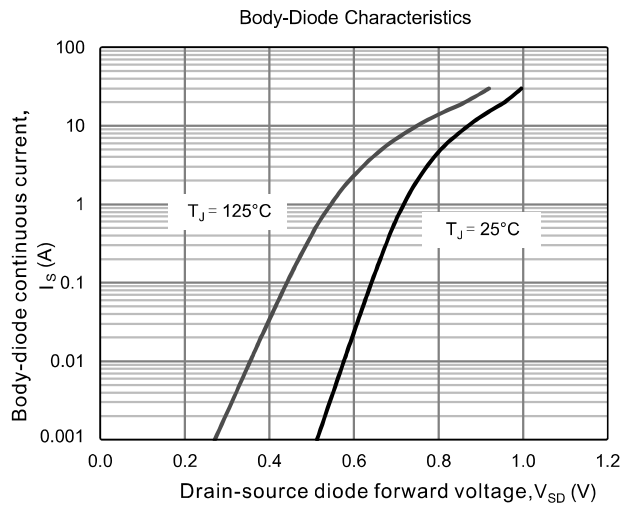
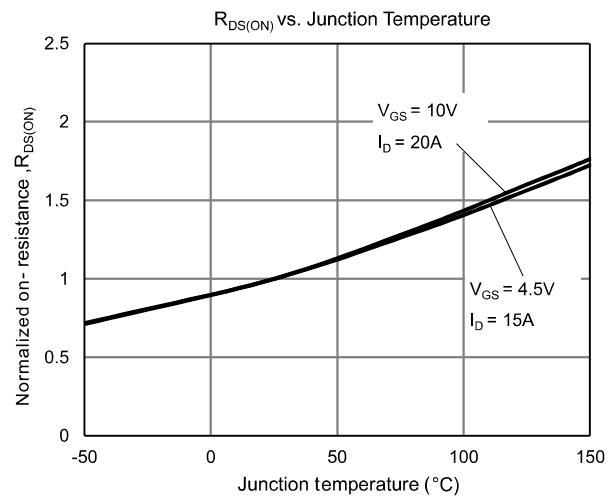
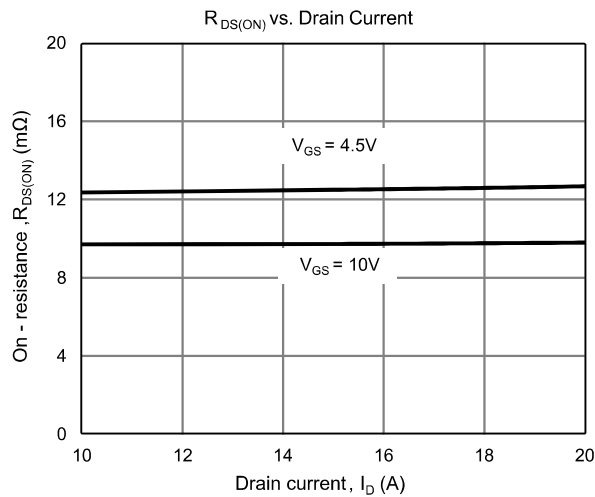
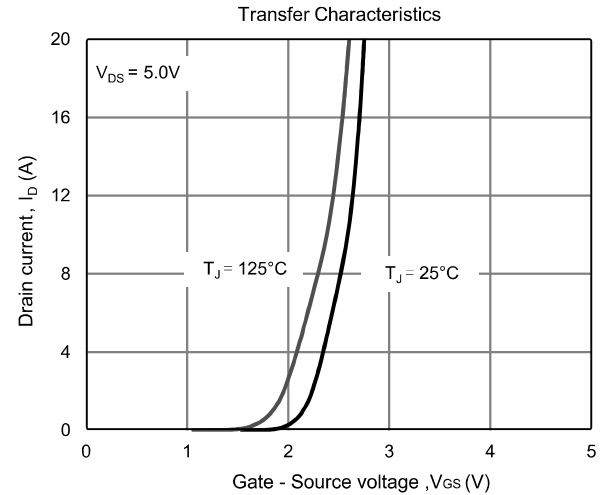
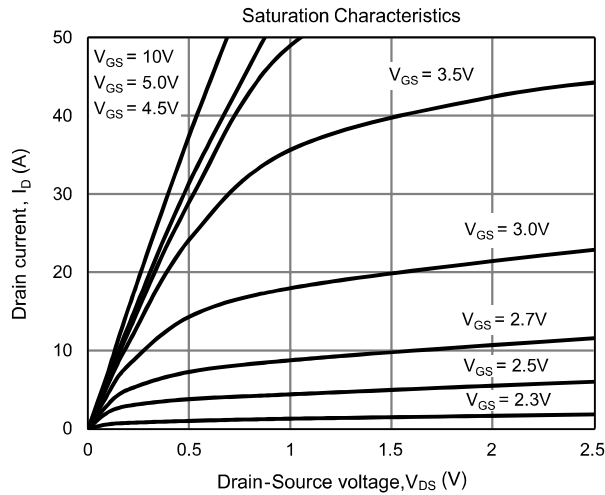
Drain-source diode forward voltage	V_{SD}	$I_S=1\text{A}$, $V_{GS}=0\text{V}$		0.69	1.0	V
Diode continuous current	I_S	$T_C=25^\circ\text{C}$			9.6	A
Reverse recovery time	t_{rr}	$I_F=15\text{A}$, $dI_F/dt=100\text{A}/\mu\text{s}$		24		ns
Reverse recovery charge	Q_{rr}			9.3		nC

Note :

1: Computed continuous current assumes the condition of T_{JMax} while the actual continuous current depends on the thermal & electro-mechanical application board design.2: This single-pulse measurement was taken under $T_{JMax}=150^\circ\text{C}$.3: This single-pulse measurement was taken under the following condition [$L=100\mu\text{H}$, $V_{GS}=10\text{V}$, $V_{DS}=30\text{V}$] while its value is limited by $T_{JMax}=150^\circ\text{C}$.4: The power dissipation P_D is based on $T_{JMax}=150^\circ\text{C}$.

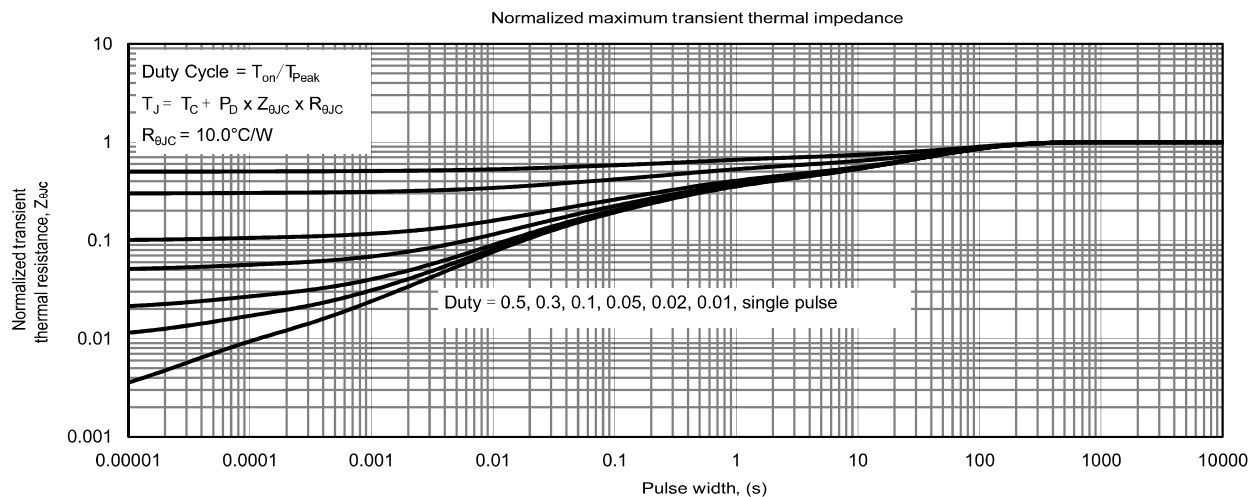
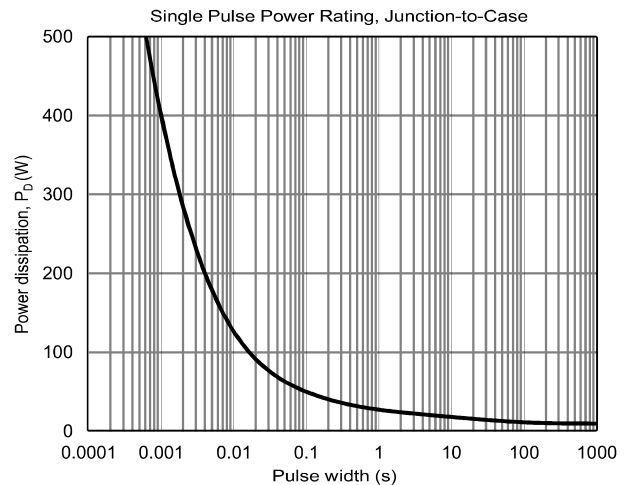
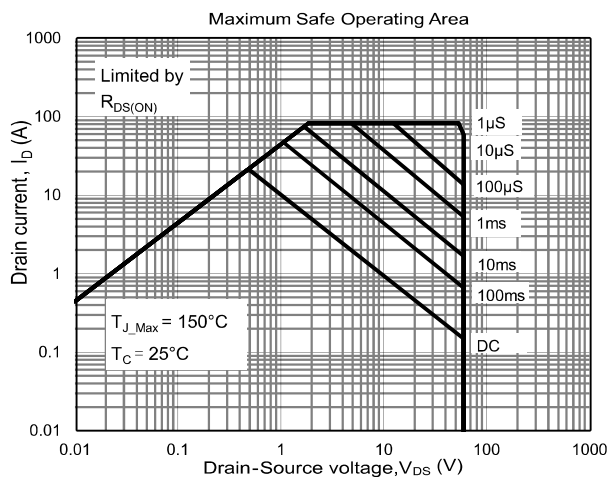
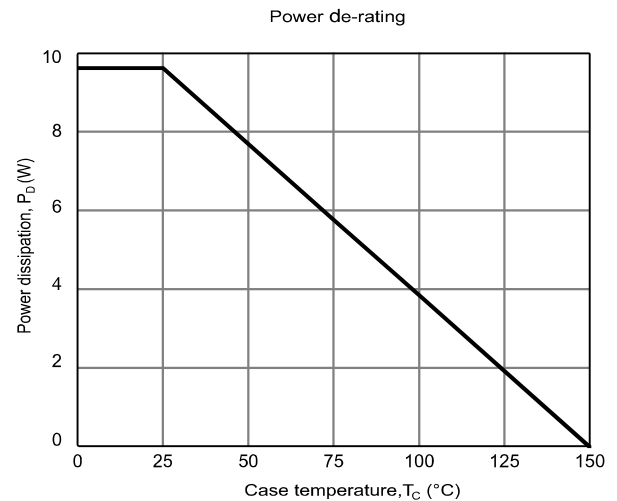
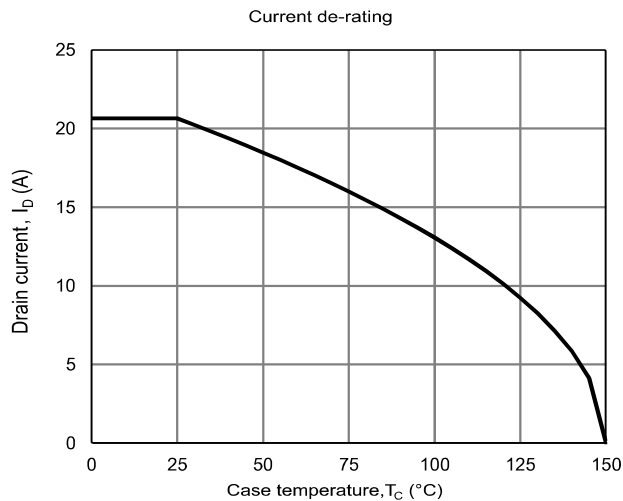
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Rating and characteristic curves



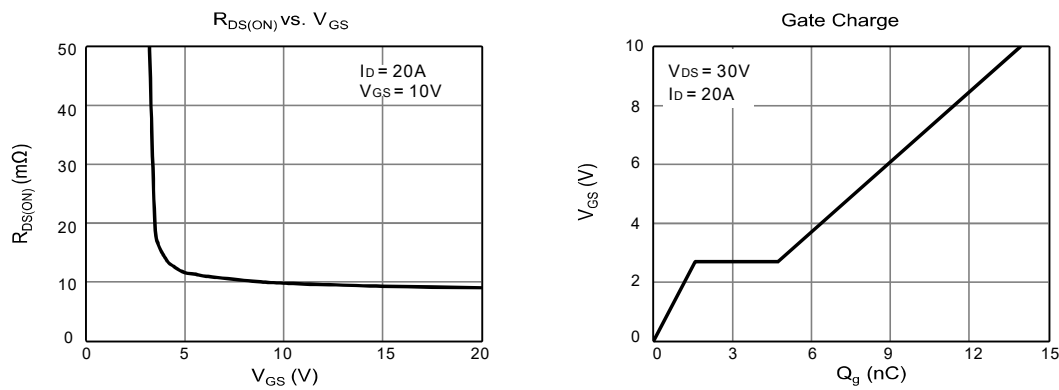
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Rating and characteristic curves



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Rating and characteristic curves



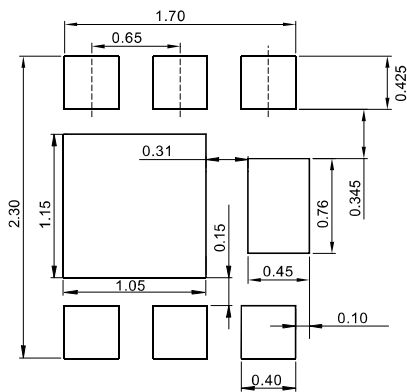
Pinning information

Pin	Simplified outline	Symbol
Pin 1, 2, 5, 6 Drain Pin 3 Gate Pin 4 Source	Top view Bottom view	

Marking

Type number	Marking code
FMOSM21N06	BN

Suggested solder pad layout



Note:
1.Controlling dimension:in millimeters.
2.General tolerance:±0.05mm.
3.The pad layout is for reference purposes only.

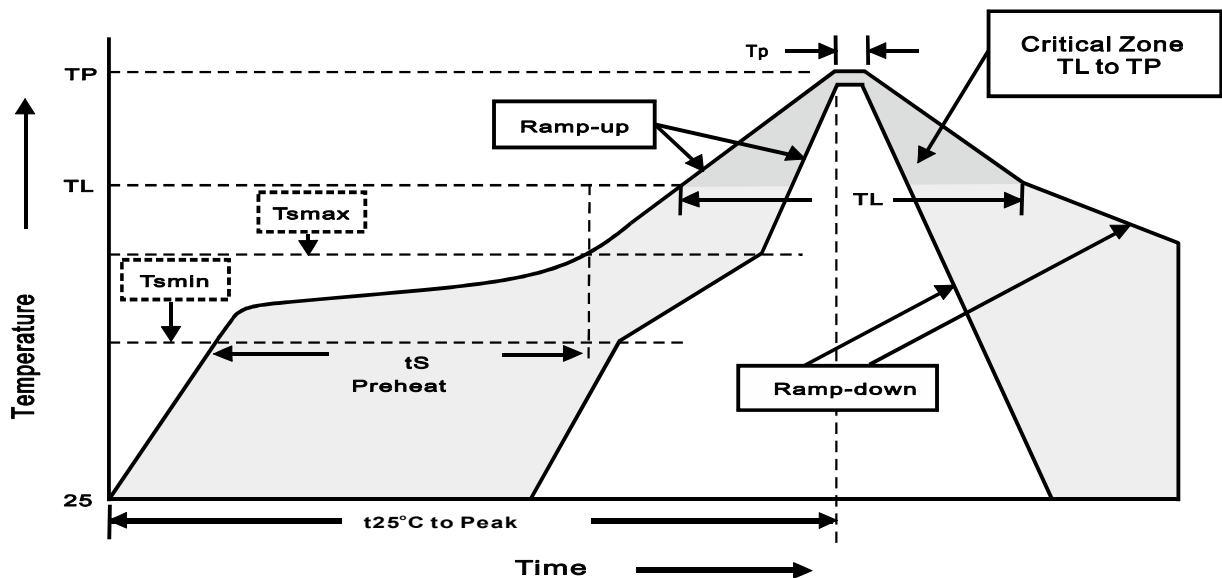
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Reel packing

Package	Reel size	Reel (pcs)	Component Spacing (m/m)	Box (pcs)	Inner Box (m/m)	Reel DIA, (m/m)	Carton Size (m/m)	Carton (pcs)
T2020P6	7"	3,000	4	30,000	183*123*183	178	382*356*392	240,000

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 -Temperature Min(T _{smIn}) -Temperature Max(T _{smax}) -Time(min to max)(t _s)	150°C 200°C 60~120sec
T _{smax} to T _L -Ramp-upRate	<3°C/sec
Time maintained above: -Temperature(T _L) -Time(t _L)	217°C 60~260sec
Peak Temperature(T _P)	255°C-0/+5°C
Time within 5°C of actual Peak Temperature(t _P)	10~30sec
Ramp-down Rate	<3°C/sec
Time 25°C to Peak Temperature	<6minutes