

FMOSAB60N02

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FMOSAB60N02

60A 20V N-Channel Enhancement
Mode Power MOSFET

Features

- $V_{DS}=20V$, $I_D=60A$.
- $R_{DS(ON)} \leq 3.9 m\Omega$, @ $V_{GS} = 4.5V$, $I_D=30V$.
- $R_{DS(ON)} \leq 4.9 m\Omega$, @ $V_{GS} = 2.5V$, $I_D=20V$.
- Advanced trench technology.
- Excellent on-resistance and low gate charge.
- 100% UIS and ΔV_{ds} tested.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" indicates halogen free part, ex: FMOSAB60N02-H.

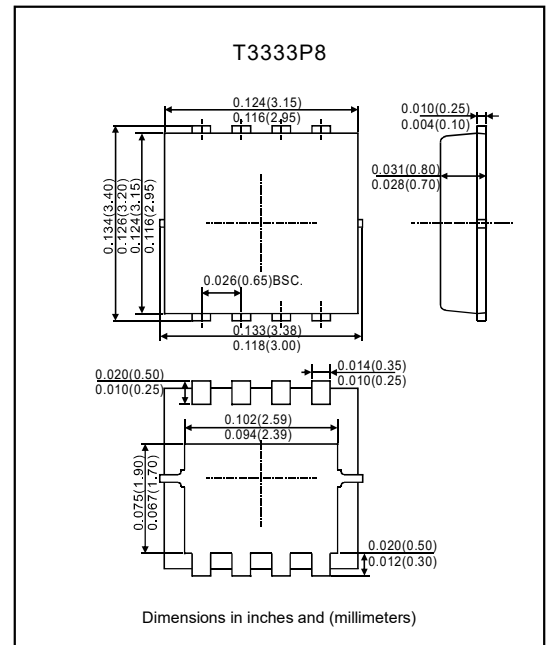
Applications

- Power management.
- PWM application.
- Load switching.

Mechanical data

- Epoxy:UL94-V0 rated flame retardant.
- Case : Molded plastic, T3333P8.
- Mounting Position : Any.

Package outline

Maximum ratings (At $T_c=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Ratings	Units
Drain-Source voltage	V_{DS}	20	V
Gate-Source voltage	V_{GS}	± 12	V
Continuous drain current ($T_c=25^\circ C$) ($T_c=100^\circ C$)	I_D	60	A
		38	
Pulsed drain current (Note1)	I_{DM}	240	A
Single pulsed avalanche energy (Note2)	E_{AS}	121	mJ
Power dissipation	P_D	39	W
Thermal resistance, Junction to ambient (Note3)	$R_{\theta JA}$	40	$^\circ C/W$
Thermal resistance, Junction to case	$R_{\theta JC}$	3.2	$^\circ C/W$
Operating junction temperature	T_J	+150	$^\circ C$
Storage temperature range	T_{STG}	-55 to +150	$^\circ C$

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

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Off characteristics						
Drain-Source breakdown voltage	BV_{DSS}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	20			V
Drain-Source leakage current	I_{DSS}	$V_{DS}=20\text{V}$, $V_{GS}=0\text{V}$			1	μA
Gate-Source leakage current	I_{GSS}	$V_{GS}=\pm 12\text{V}$, $V_{DS}=0\text{V}$			± 100	nA

On characteristics

Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	0.5	0.8	1	V
Static drain-source on-resistance (Note4)	$R_{DS(on)}$	$V_{GS}=4.5\text{V}$, $I_D=30\text{A}$		3	3.9	m Ω
		$V_{GS}=2.5\text{V}$, $I_D=20\text{A}$		3.8	4.9	

Dynamic characteristics

Input capacitance	C_{iss}	$V_{DS}=10\text{V}$, $V_{GS}=0\text{V}$, $f=1.0\text{MHz}$		3476		pF
Output capacitance	C_{oss}			528		
Reverse transfer capacitance	C_{rss}			464		

Switching characteristics

Total gate charge	Q_g	$V_{GS}=0$ to 8V , $V_{DS}=10\text{V}$, $I_D=30\text{A}$		65		nC
Gate-Source charge	Q_{gs}			8		
Gate-Drain Charge	Q_{gd}			12		
Turn-on delay time	$t_{d(on)}$	$V_{DS}=10\text{V}$, $V_{GS}=10\text{V}$, $I_D=30\text{A}$, $R_G=3\Omega$		8		ns
Turn-on rise time	t_r			19		
Turn-off delay time	$t_{d(off)}$			73		
Turn-off fall time	t_f			80		

Drain-Source diode characteristics and maximum ratings

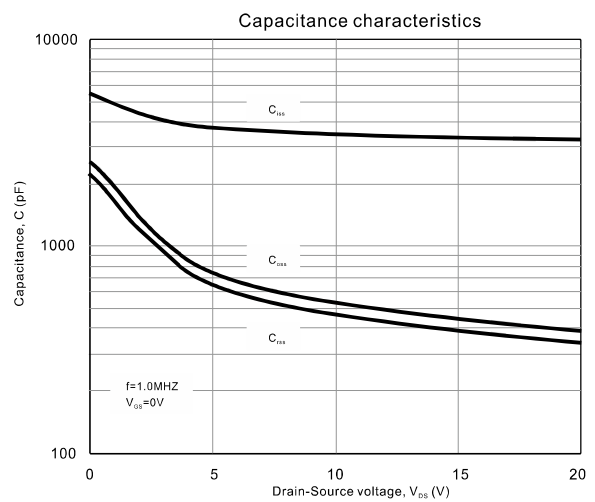
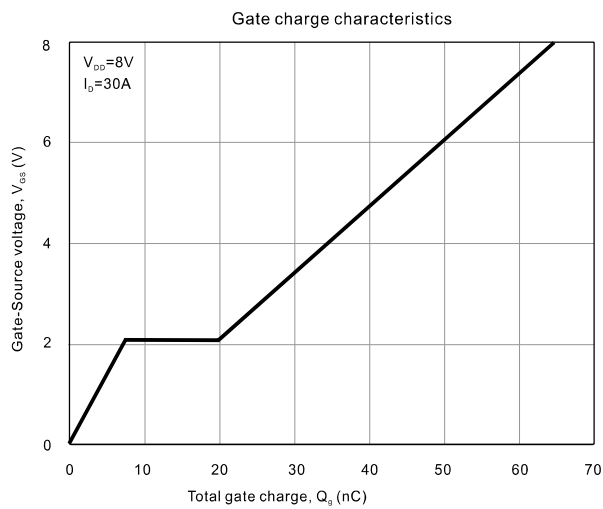
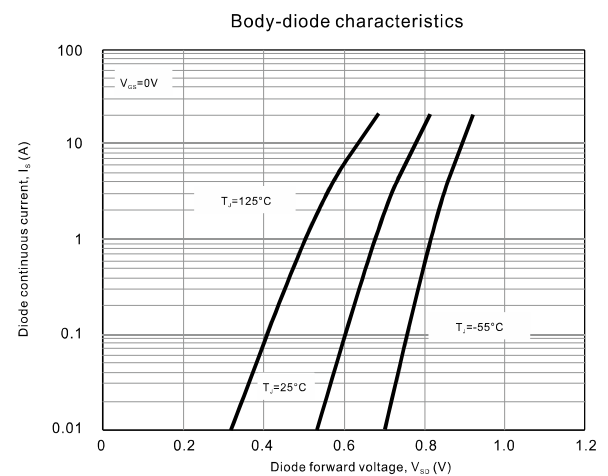
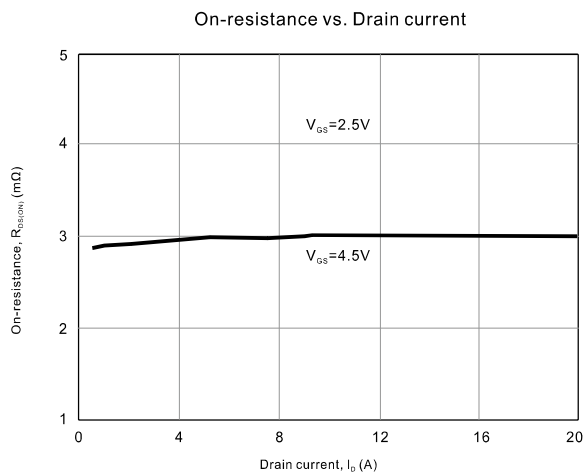
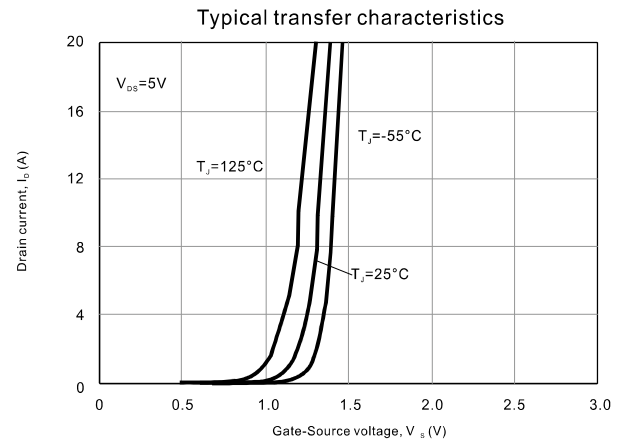
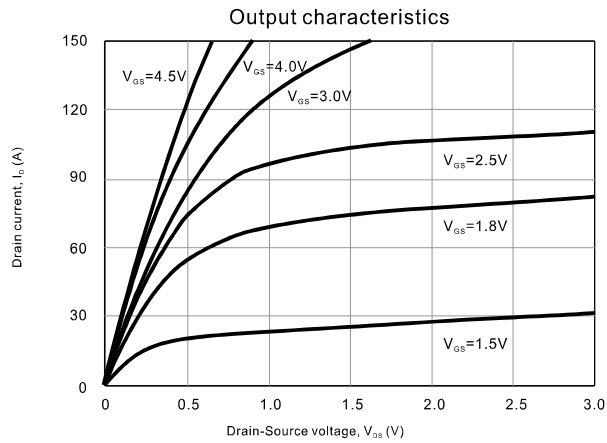
Maximum continuous drain-source forward current	I_S				60	A
Maximum pulsed drain-source forward current	I_{SM}				240	A
Drain-Source diode forward voltage	V_{SD}	$V_{GS}=0\text{V}$, $I_S=30\text{A}$			1.2	V
Body diode reverse recovery time	t_{rr}	$I_F=20\text{A}$, $di/dt=100\text{A}/\mu\text{s}$		16		ns
Body diode reverse recovery charge	Q_{rr}			5.6		nC

Notes :

1. Repetitive rating: pulse width limited by maximum junction temperature.
2. E_{AS} condition: starting $T_J=25^{\circ}\text{C}$, $V_{DS}=10\text{V}$, $V_G=10\text{V}$, $R_G=25\Omega$, $L=0.5\text{mH}$, $I_{AS}=22\text{A}$.
3. $R_{\theta JA}$ is measured with the device mounted on a 1inch² pad of 2oz copper FR4 PCB.
4. Pulse test: pulse widths $\leq 300\mu\text{s}$, duty cycle $\leq 0.5\%$.

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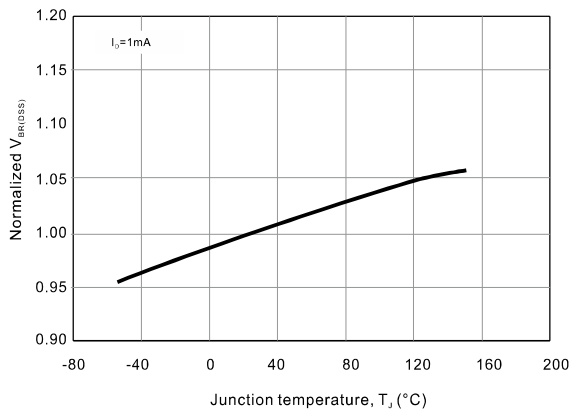
Rating and characteristic curves



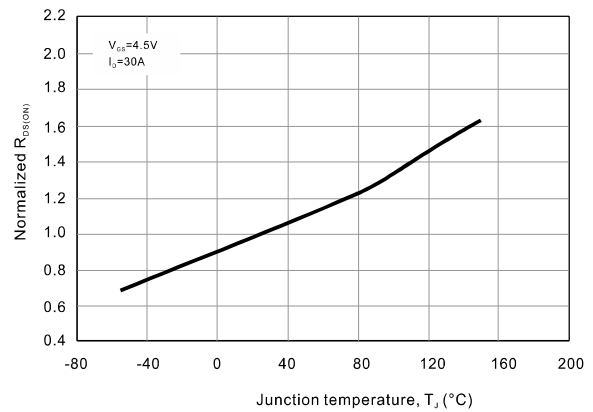
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Rating and characteristic curves

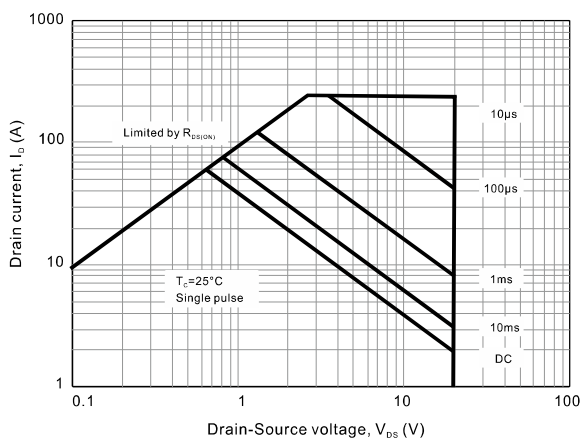
Normalized breakdown voltage vs. Junction temperature



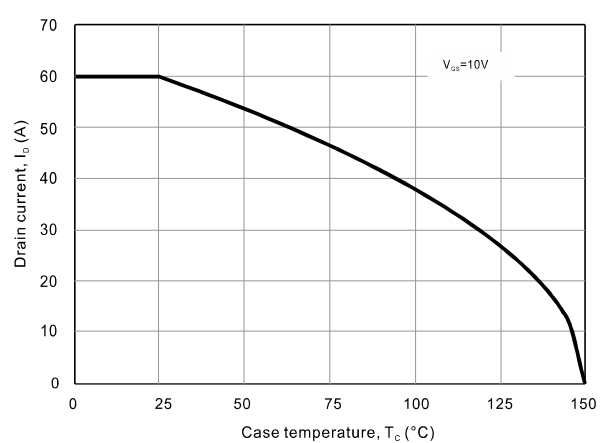
Normalized on resistance vs. Junction temperature



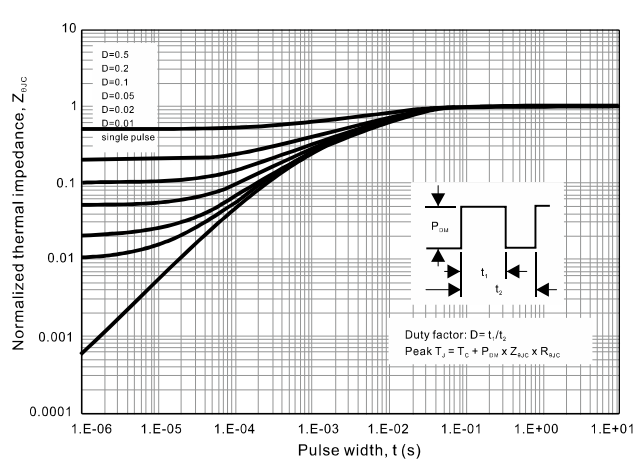
Maximum safe operating area



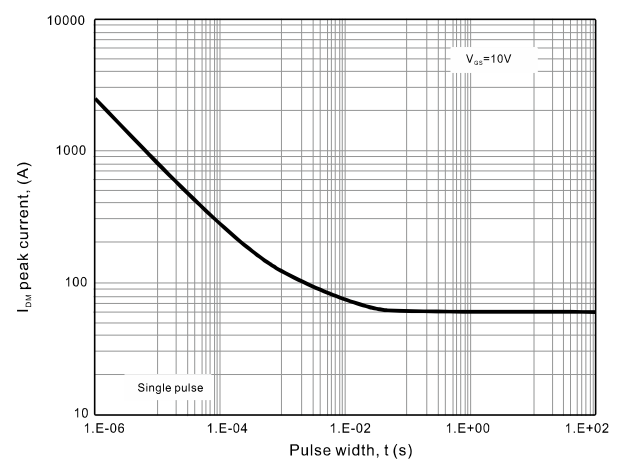
Maximum continuous drain current vs. Case temperature



Normalized maximum transient thermal impedance

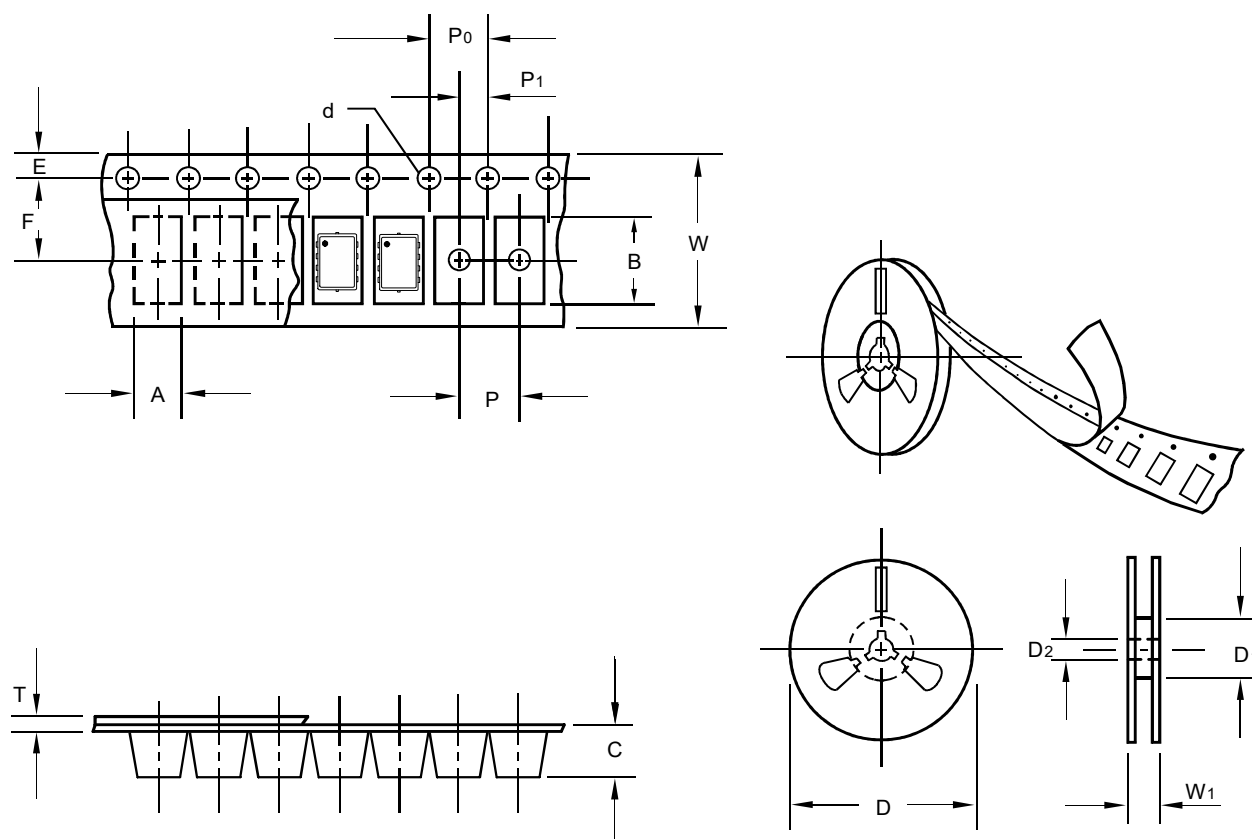


Peak current capacity



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Packing information



unit:mm

Item	Symbol	Tolerance	T3333P8
Carrier width	A	0.1	3.55
Carrier length	B	0.1	3.55
Carrier depth	C	0.1	1.10
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	330.00
13" Reel inner diameter	D ₁	min	100.00
7" Reel outside diameter	D	2.0	-
7" Reel inner diameter	D ₁	min	-
Feed hole diameter	D ₂	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	5.50
Punch hole pitch	P	0.1	8.00
Sprocket hole pitch	P ₀	0.1	4.00
Embossment center	P ₁	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	12.00
Reel width	W ₁	1.0	17.60

Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

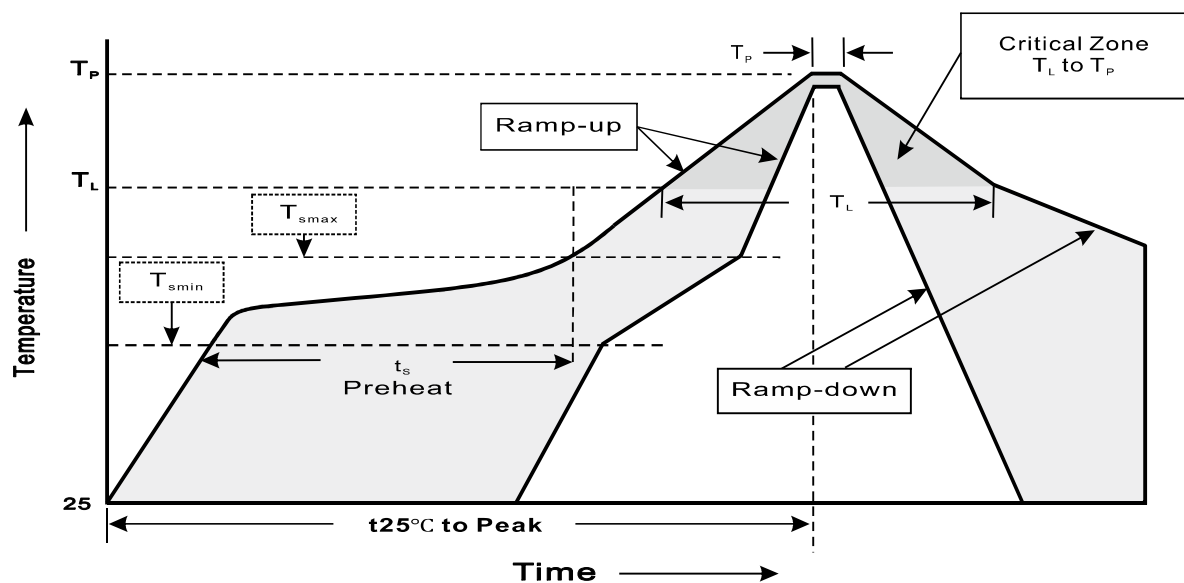
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Reel packing

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)
T3333P8	13"	5,000	8.0	10,000	355*335*38	330	350*330*360	80,000

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-up rate	< 3°C/sec
Time maintained above: -Temperature (T_L) -Time(T_L)	217°C 60 ~ 260 sec
Peak Temperature(T_P)	255°C -0/+5°C
Time within 5°C of actual peak Temperature(T_P)	10 ~ 30sec
Ramp-down rate	< 6°C/sec
Time 25°C to peak temperature	< 6 minutes