

FMOS0031N06E

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FMOS0031N06E

0.31A 60V N-Channel Enhancement Mode MOSFET ESD Protection

Features

- $V_{DS}=60V$, $I_D=0.31A$.
- $R_{DS(ON)} \leq 1.9\Omega$ @ $V_{GS}=10V$, $I_D=0.3A$.
- $R_{DS(ON)} \leq 2.2\Omega$ @ $V_{GS}=4.5V$, $I_D=0.2A$.
- Reliable and rugged.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" indicates halogen-free part, ex: FMOS0031N06E-H.

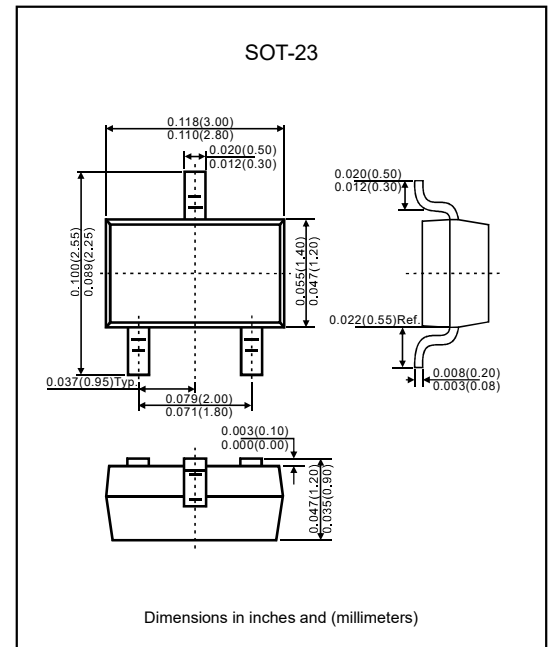
Applications

- Small signal application.
- Load switch.

Mechanical data

- Epoxy: UL94-V0 rated flame retardant.
- Case : Molded plastic, SOT-23.
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026.
- Mounting Position : Any.

Package outline



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

Parameter	Symbol	Ratings	Unit
Drain-source voltage	V_{DS}	60	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain current ($T_A=25^\circ C$)	I_D	0.31	A
		0.25	
Pulse drain current tested (Note1)	I_{DM}	0.77	A
Power dissipation ($T_A=25^\circ C$)	P_D	0.36	W
		0.23	
Thermal resistance, junction to ambient (Note3) (steady state)	$R_{\theta JA}$	350	$^\circ C/W$
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 specified)

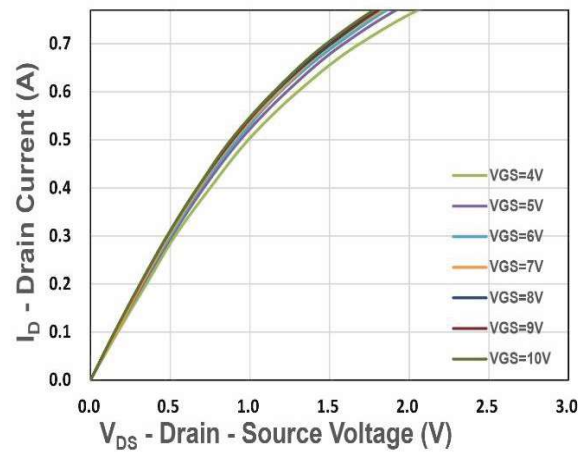
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off characteristics						
Drain-source breakdown voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	60			V
Drain-source leakage current	I _{DSS}	V _{DS} =48V, V _{GS} =0V			1	μA
Gate-source leakage current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V			±10	μA
On characteristics						
Gate threshold voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	1	1.6	2.5	V
Static drain-source on-resistance (Note3)	R _{DS(ON)}	V _{GS} =10V, I _D =0.3A		1.6	1.9	Ω
		V _{GS} =4.5V, I _D =0.2A		1.7	2.2	
Forward transconductance	g _{FS}	V _{DS} =10V, I _D =0.15A		0.45		S
Dynamic Parameters (Note4)						
Input capacitance	C _{iss}	V _{GS} =0V, V _{DS} =30V, f=1.0MHz		26.2		pF
Output capacitance	C _{oss}			2.7		
Reverse transfer capacitance	C _{rss}			1.7		
Switching parameters (Note4)						
Total gate charge	Q _g	V _{GS} =4.5V, V _{DS} =30V, I _D =1A		0.9		nC
		V _{GS} =10V, V _{DS} =30V, I _D =1A		1.7		
					0.4	
Gate to source charge	Q _{gs}			0.4		
Gate to Drain charge	Q _{gd}			0.3		
Turn-on delay time	t _{d(on)}	V _{DS} =30V, V _{GS} =10V, I _D =0.3A, R _G =10Ω		1		ns
Rise time	t _r			19.4		
Turn-off delay time	t _{d(off)}			23.2		
Fall time	t _f			21		
Source-drain diode ratings and characteristics						
Drain - source diode forward voltage (Note4)	V _{SD}	I _{SD} =0.15A, V _{GS} =0V		0.8	1.1	V
Reverse recovery time	t _{rr}	I _F =0.1A, V _R =0V, dI _F /dt=100A/μs		7.4		ns
Reverse recovery charge	Q _{rr}			2.3		nC

Note: 1. Maximum current is limited by junction temperature.
2. Surface mounted on 1in² FR-4 board with 1oz.
3. Pulse test: pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
4. Guaranteed by design, no subject to production testing.

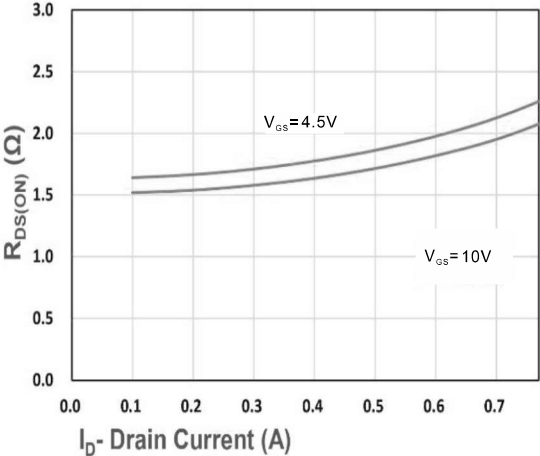
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Rating and characteristic curves

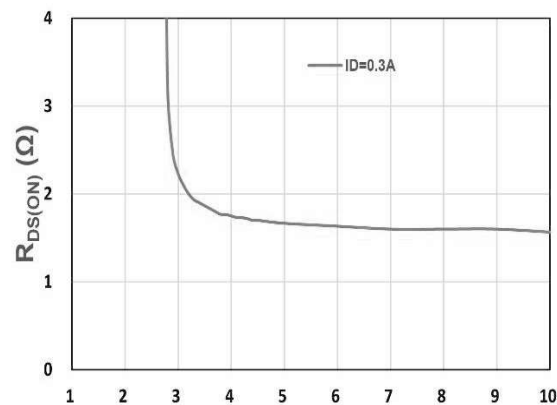
Output characteristics



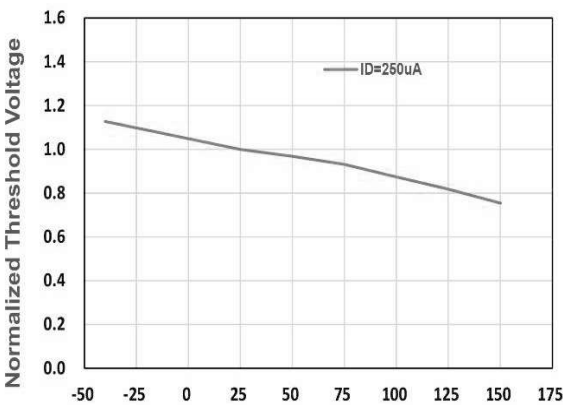
On-resistance vs. Drain current



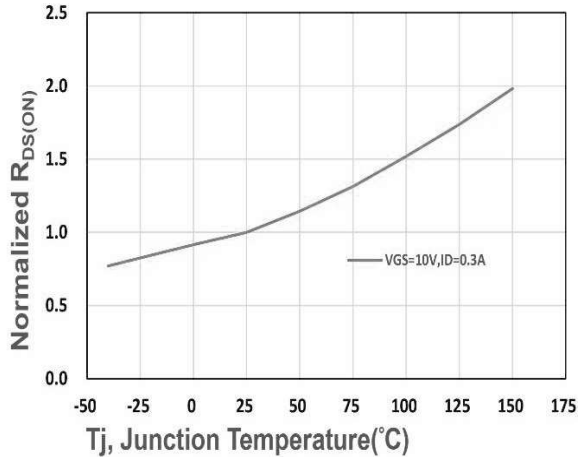
On-resistance vs. Gate-Source voltage



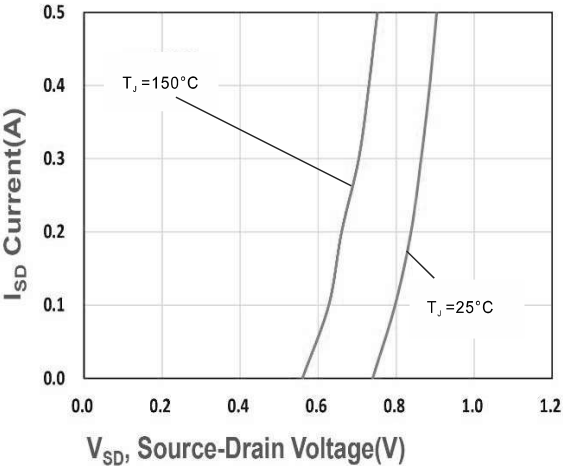
Gate threshold voltage



Drain-Source on-resistance

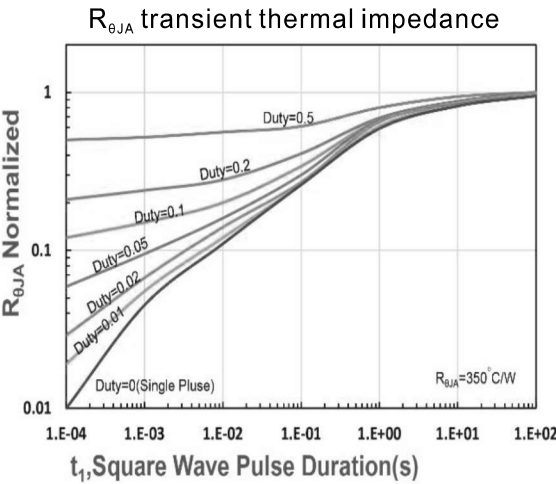
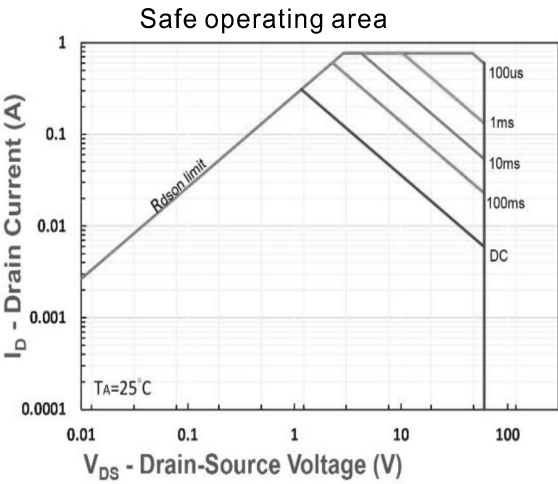
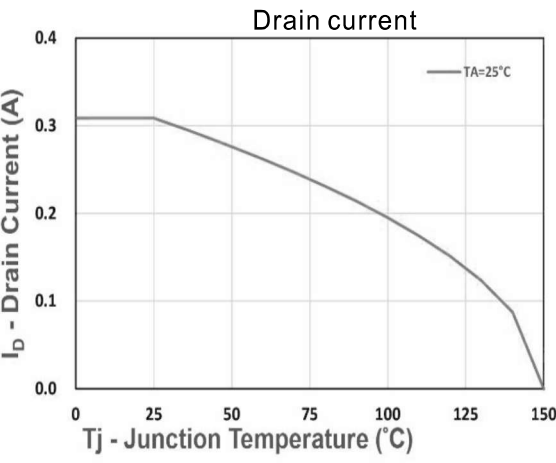
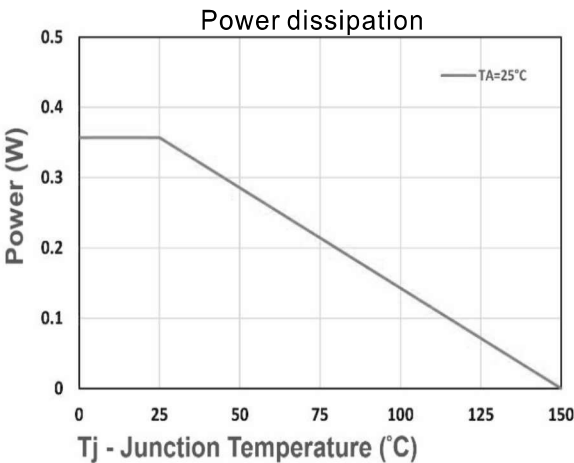
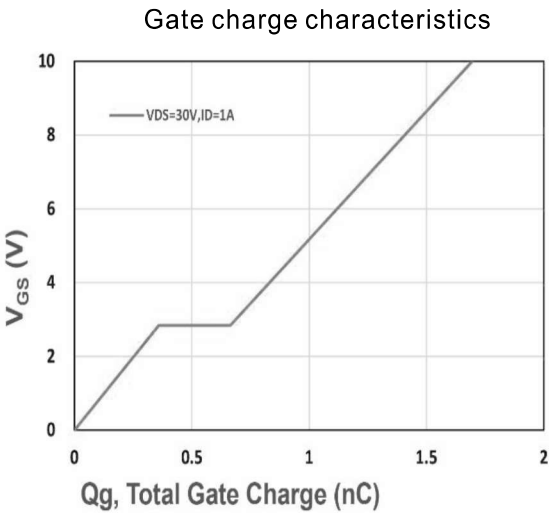
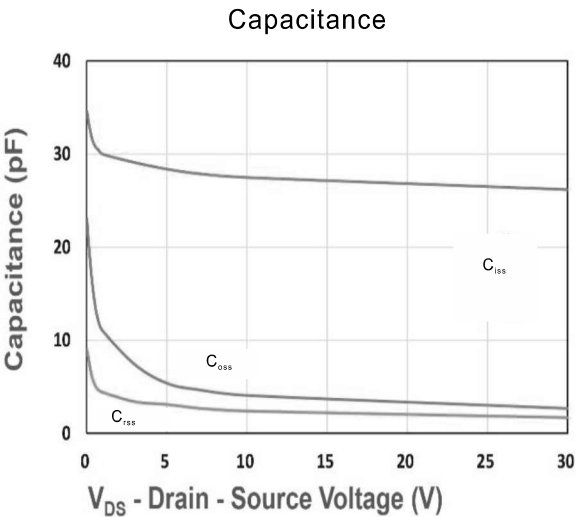


Source-Drain diode forward



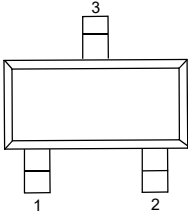
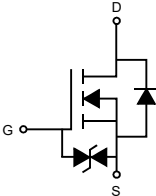
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Rating and characteristic curves



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Pinning information

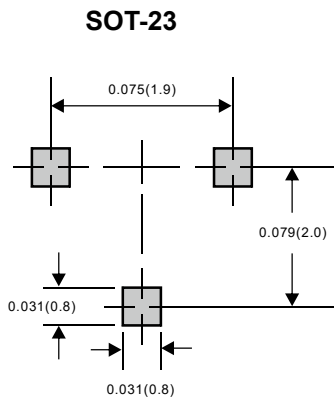
Pin	Simplified outline	Symbol
Pin1 Gate Pin2 Source Pin3 Drain		

Marking

Type number	Marking code
FMOS0031N06E	XXYWS

*XX : Product code.
YWS: Wafer lot code.
Y: Year
W: Weekly
S:Sequence

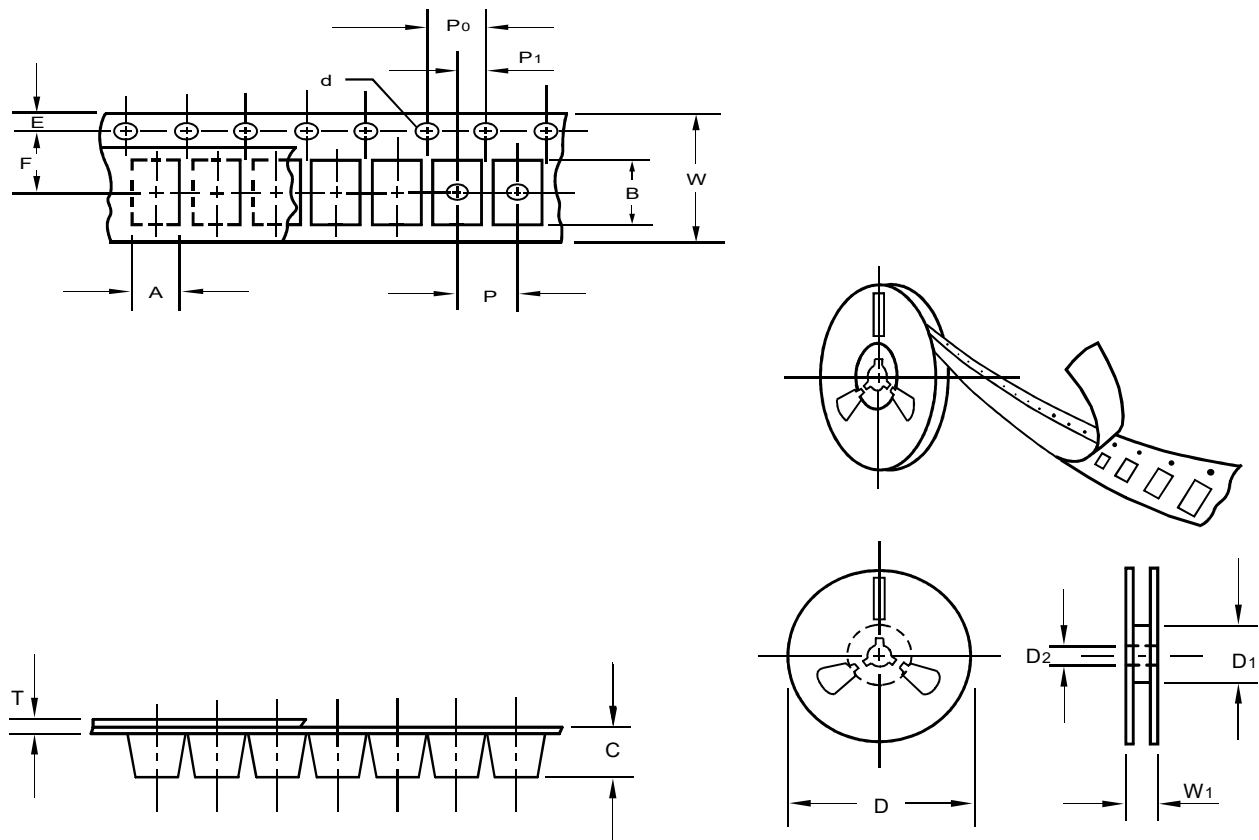
Suggested solder pad layout



Dimensions in inches and (millimeters)

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Packing information



unit:mm

Item	Symbol	Tolerance	SOT-23
Carrier width	A	0.1	3.15
Carrier length	B	0.1	2.77
Carrier depth	C	0.1	1.22
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D1	min	54.40
Feed hole diameter	D2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.50
Punch hole pitch	P	0.1	4.00
Sprocket hole pitch	P0	0.1	4.00
Embossment center	P1	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W1	1.0	11.40

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

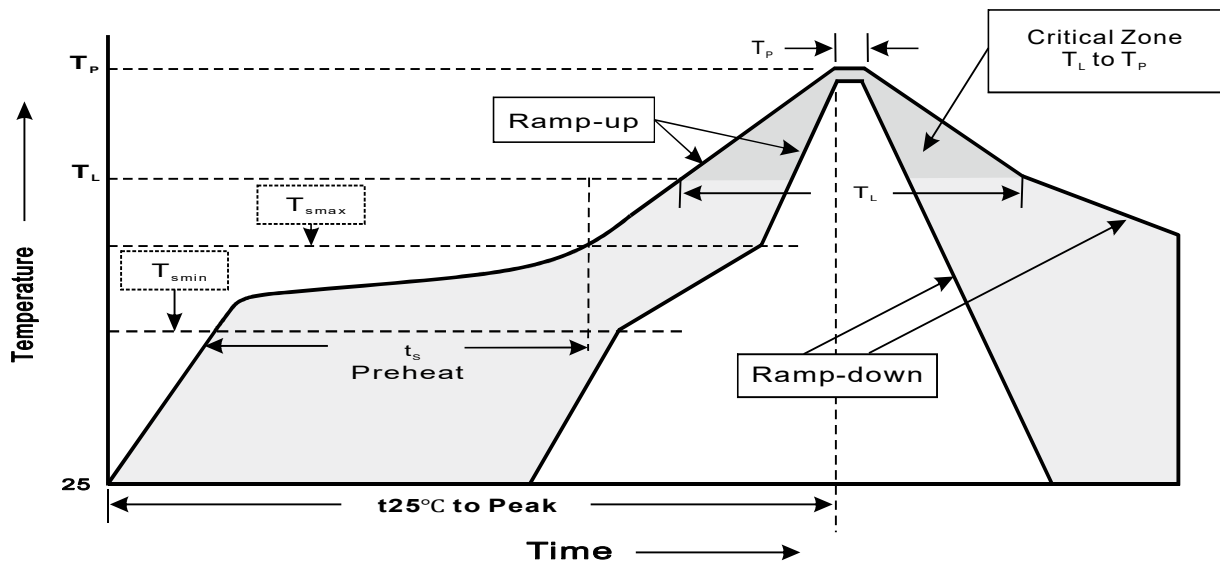
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Reel packing

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)
SOT-23	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	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-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