

FMOS05N04

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FMOS05N04

5A 40V N-Channel Enhancement Mode Power MOSFET

Features

- $V_{DS} = 40V$, $I_D = 5A$.
- $R_{DS(ON)} < 39m\Omega$, $V_{GS} = 10V$, $I_D = 4A$.
- $R_{DS(ON)} < 52m\Omega$, $V_{GS} = 4.5V$, $I_D = 3A$.
- Advanced Trench Technology.
- Excellent $R_{DS(ON)}$ and Low Gate Charge.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" for Halogen-free part, ex. FMOS05N04-H.

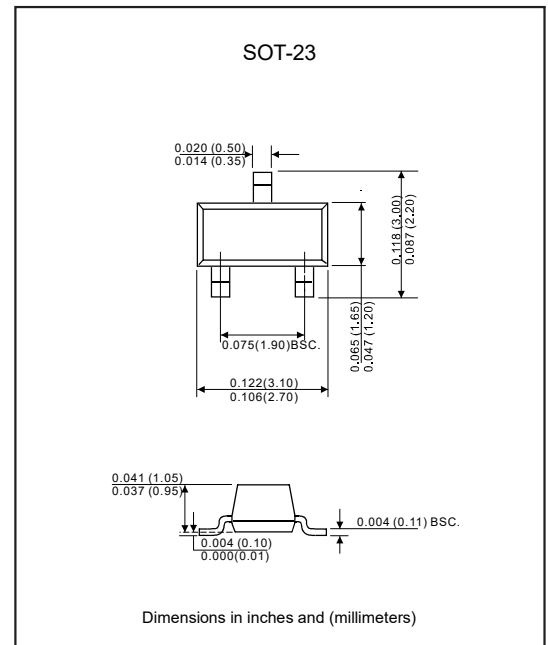
Application

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

Mechanical data

- Epoxy: UL94-V0 rated flame retardant.
- Case : Molded plastic, SOT-23.
- Mounting Position : Any.

Package outline



Maximum Ratings (At $T_A = 25^\circ C$ Unless otherwise noted)

Parameter	Symbol	Rating	Unit
Drain source voltage	V_{DS}	40	V
Gate source voltage	V_{GS}	± 20	V
Drain current continuous	I_D	5	A
		3	
Pulsed drain current (Note 1)	I_{DM}	20	A
Power dissipation	P_D	1.3	W
Thermal resistance junction to ambient	$R_{\theta JA}$	100	$^\circ C/W$
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	Conditions	Symbol	Min.	Typ.	Max.	Unit
Static parameters						
Drain-source breakdown voltage	$I_D=250\mu A, V_{GS}=0V$	BV_{DSS}	40			V
Drain-source leakage current	$V_{DS}=40V, V_{GS}=0V$	I_{DSS}			1	μA
Gate-source leakage current	$V_{GS}=\pm 20V, V_{DS}=0V$	I_{GSS}			± 100	nA
Gate threshold voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	$V_{GS(TH)}$	1.3	1.9	2.3	V
Static drain-source on-state resistance (Note 3)	$V_{GS}=10V, I_D=4A$	$R_{DS(ON)}$		30	39	m Ω
	$V_{GS}=4.5V, I_D=3A$			40	52	
Dynamic parameters						
Input capacitance	$V_{GS}=0V, V_{DS}=20V, f=1.0MHz$	C_{iss}		536		pF
Out capacitance		C_{oss}		42		
Reverse transfer capacitance		C_{rss}		33		
Switching parameters						
Total gate charge	$V_{GS}=0$ to 10V, $V_{DS}=20V, I_D=3A$	Q_g		11		nC
Gate to source charge		Q_{gs}		2		
Gate to drain charge		Q_{gd}		2		
Turn-on delay time	$V_{DS}=20V, V_{GS}=10V, R_G=3\Omega, I_D=3A$	$t_{d(on)}$		4		ns
Rise time		t_r		2		
Turn-off delay time		$t_{d(off)}$		15		
Fall time		t_f		2		
Source-drain diode ratings and characteristics						
Diode continuous current		I_S			5	A
Pulsed drain-source diode forward current		I_{SM}			20	A
Drain-source diode forward voltage	$I_{SD}=5A, V_{GS}=0V$	V_{SD}			1.2	V
Reverse recovery time	$I_F=3A, dI_F/dt=100A/\mu s$	t_{rr}		9		ns
Reverse recovery charge		Q_{rr}		4		nC

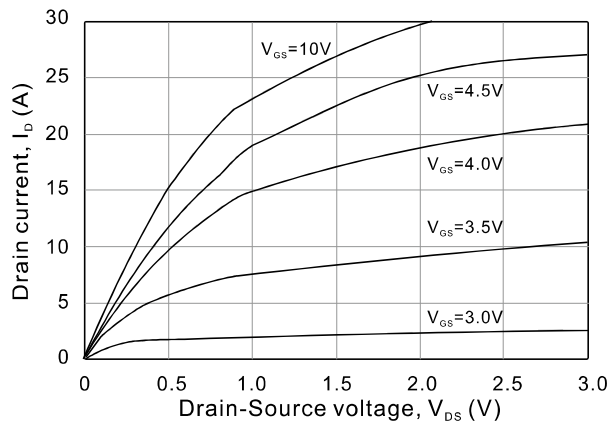
Note: 1. Repetitive rating: pulse width limited by maximum junction temperature.

2. $R_{\theta JA}$ is measured with the device mounted on a 1 inch² pad of 2oz copper FR4 PCB.3. Pulse test: pulse widths 300 μs , duty cycle $\leq 0.5\%$.

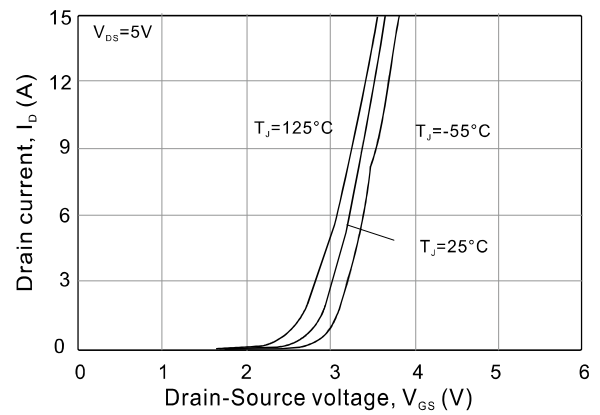
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Rating and Characteristic Curves

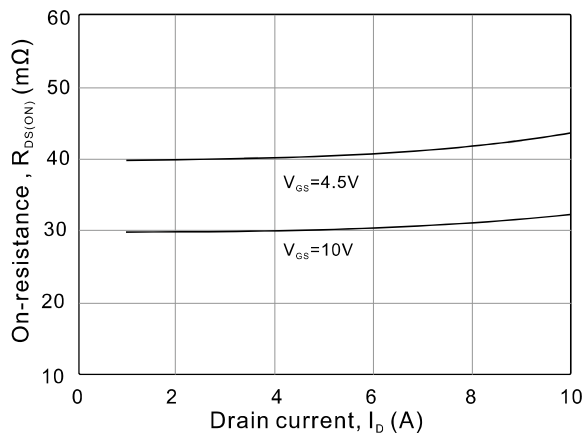
Output characteristics



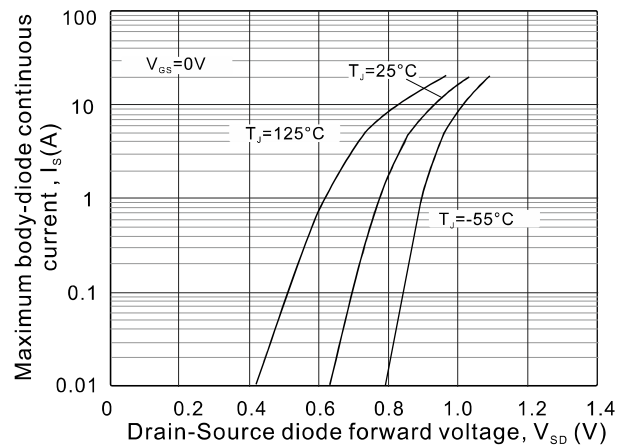
Typical transfer characteristics



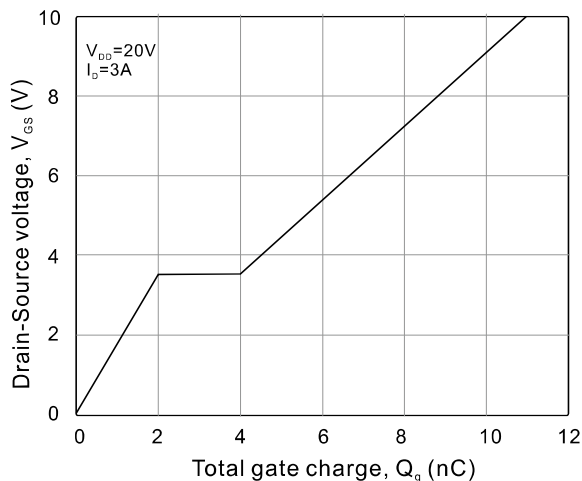
On-resistance vs. Drain current



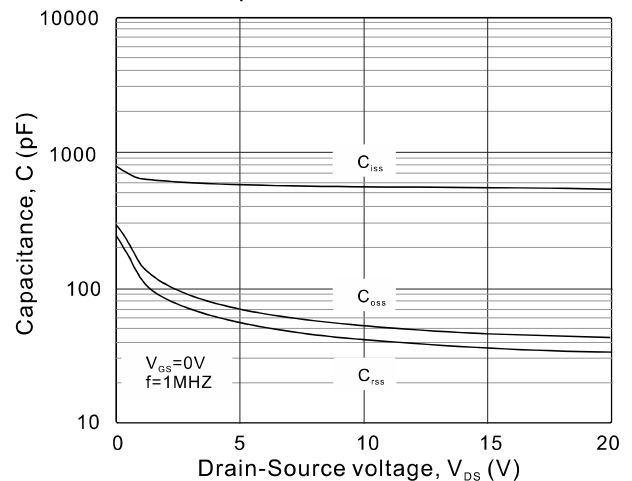
Body diode characteristics



Gate charge characteristics

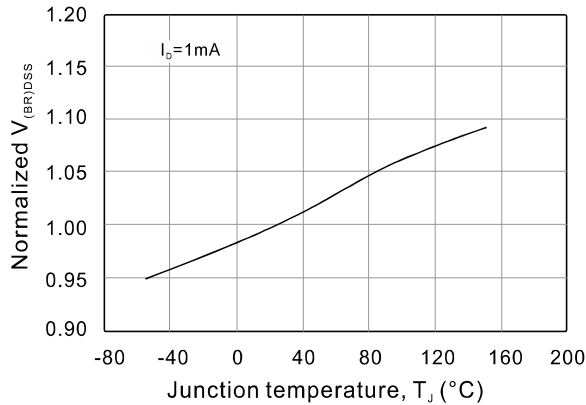
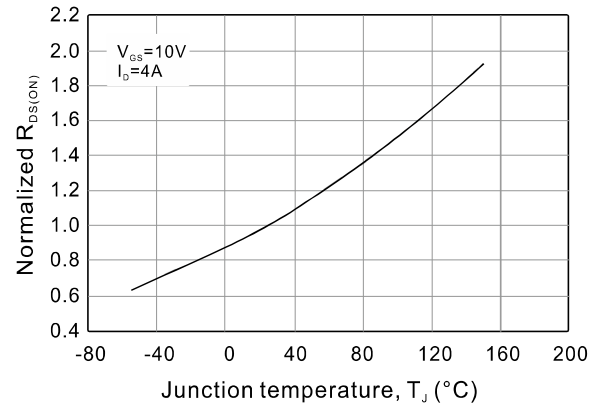


Capacitance characteristics

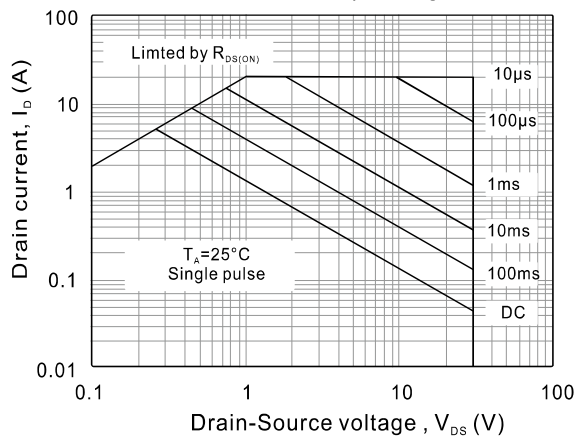
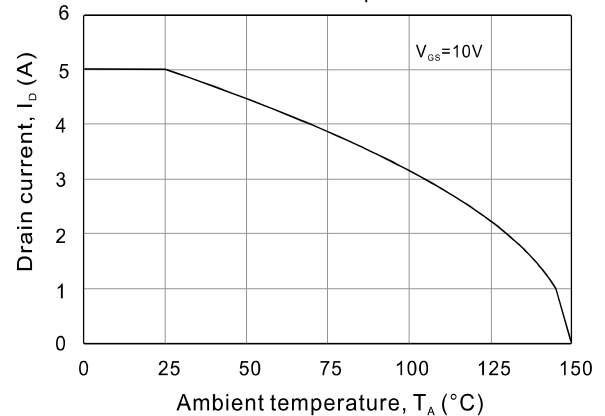
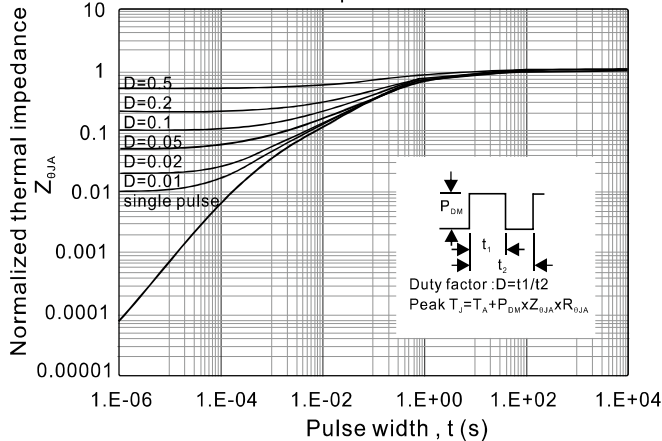


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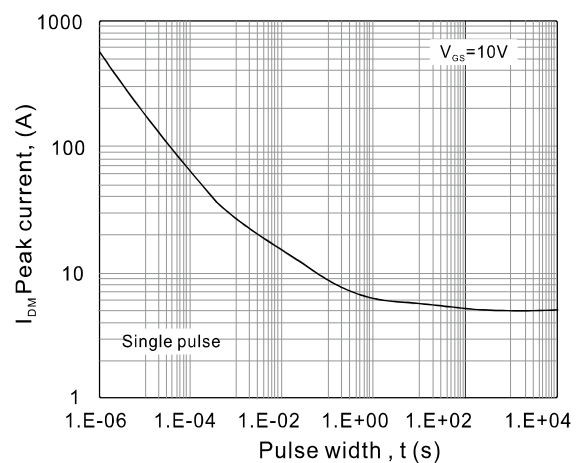
Rating and Characteristic Curves

Normalized breakdown voltage vs.
Junction temperatureNormalized on-resistance vs.
Junction temperature

Maximum safe operating area

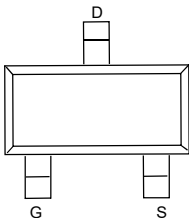
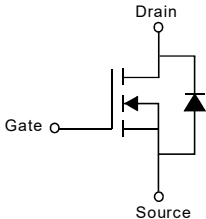
Maximum continuous drain current vs.
Ambient temperatureNormalized maximum transient thermal
impedance

Peak current capacity



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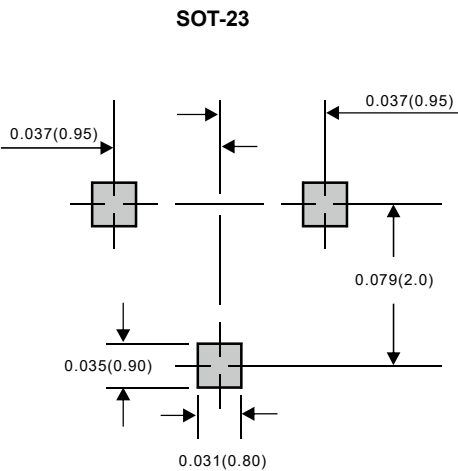
Pinning information

Pin	Simplified outline	Symbol
Pin G Gate Pin S Source Pin D Drain		

Marking

Type number	Marking code
FMOS05N04	4040

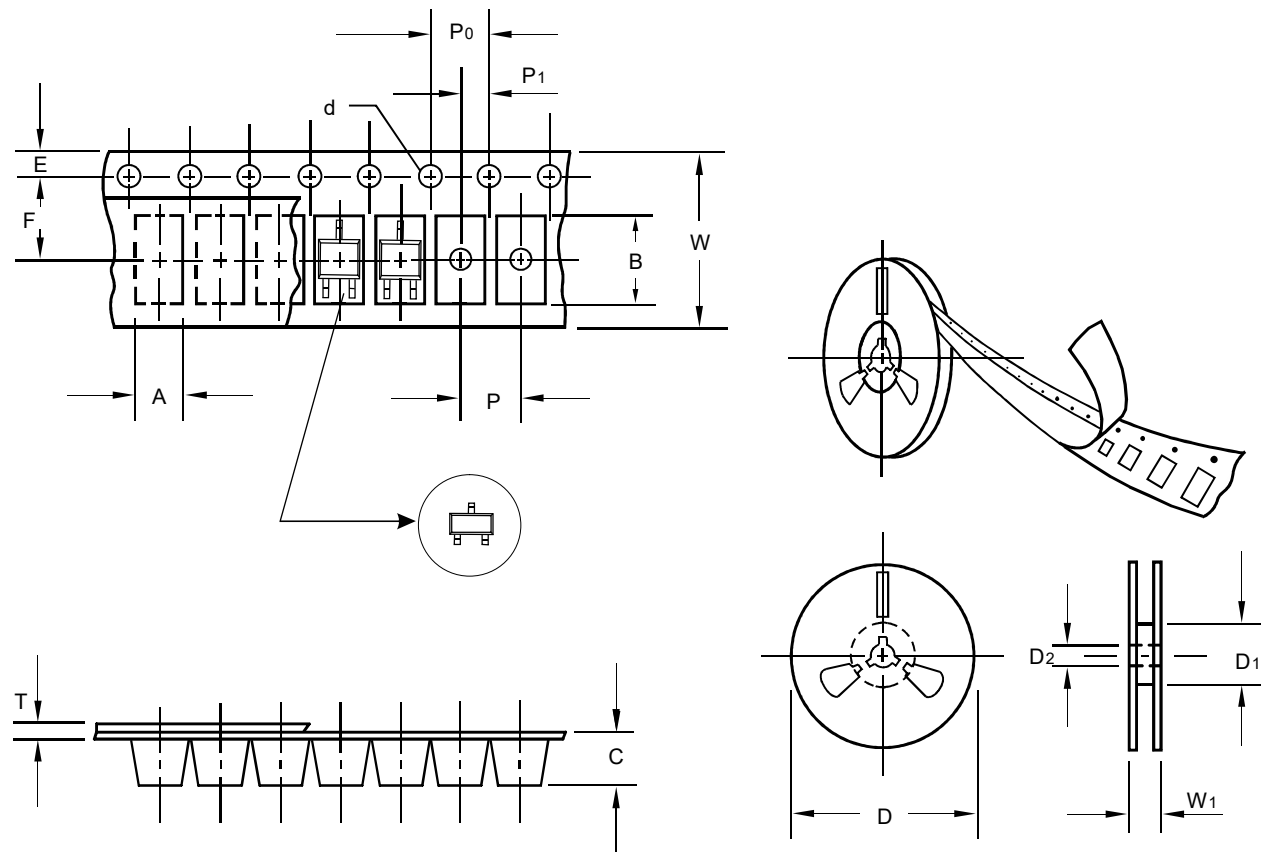
Suggested solder pad layout



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	55.00
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	12.0

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

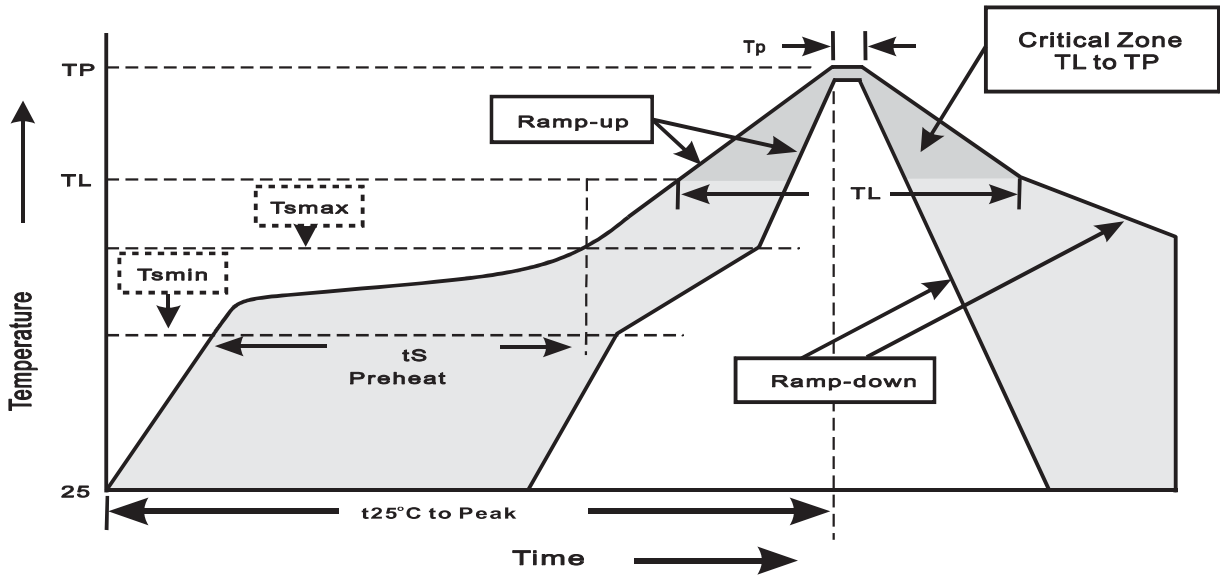
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Reel packing

DEVICE	OUTLINE	REEL (PCS)	TAPE & REEL
FMOS05N04	TAPING	3,000	7inch

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 _{smín}) -Temperature Max(T _{smáx}) -Time(min to max)(t _s)	150°C 200°C 60~120sec
T _{smáx} 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	<6°C/sec
Time 25°C to Peak Temperature	<6minutes