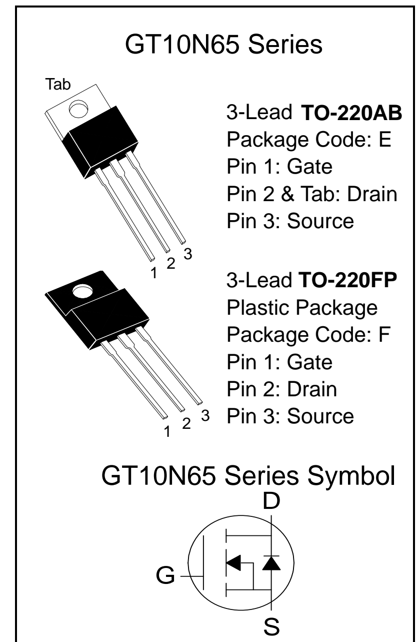
GT10N65 Series

N-Channel Power MOSFET (650V,10A)



Applications

- Switch Mode Power Supply
- Uninterruptable Power Supply
- High Speed Power Switching

Features

- GT10N65 is a High voltage NChannel enhancement mode power MOSFET chip fabricated in advanced silicon epitaxial planar technology
- Advanced termination scheme to provide enhanced voltageblocking capability
- Avalanche Energy Specified
- Source to Drain Diode Recovery Time Comparable to a Discrete Fast Recovery Diode;
- The packaged product is widely used in AC-DC power suppliers, DCDC converters and Hbridge PWM motor drivers

Absolute Maximum Ratings

Symbol	Parameter	Value		Units
V_{DSS}	Drain-Source Voltage	650		V
I_D	Continuous Drain Current (V_{GS}@10V, T_C=25°C)	10		A
	Continuous Drain Current (V_{GS}@10V, T_C=100°C)	6.4		A
I_{DM}	Pulsed Drain Current[*1]	36		A
V_{GS}	Gate-to-Source Voltage	±30		V
P_D	Total Power Dissipation (T_C=25°C)	TO-220AB	150	W
		TO-220FP	50	
	Linear Derating Factor	TO-220AB	1.25	W/°C
		TO-220FP	0.4	
E_{AS}	Single Pulse Avalanche Energy[*2]	700		mJ
I_{AR}	Avalanche Current[*1]	10		A
E_{AR}	Repetitive Avalanche Energy[*1]	66		mJ
T_J	Operating Junction Temperature Range	-55 to 150		°C
T_{stg}	Storage Temperature Range	-55 to 150		°C

*1: Repetitive rating; pulse width limited by max. junction temperature
*2: Starting T_J=25°C, L=1.2mH, R_G=25Ω, I_{AS}=10A
*3: I_{SD}≤14A, di/dt≤130A/us, V_{DD}≤$V_{(BR)DSS}$, T_J≤150°C

Thermal Characteristics

Symbol	Parameter	Value		Units
$R\theta_{JC}$	Thermal Resistance Junction to Case (Max.)	TO-220AB	1.3	°C/W
		TO-220FP	5	
$R\theta_{JA}$	Thermal Resistance Junction to Ambient (Max.)	62		°C/W

ELectrical Characteristics (T_j=25°C, unless otherwise specified)

Symbol	Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250uA	650	-	-	V
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	Reference to 25°C, I_D=1mA	-	0.58	-	V/°C
I_{DSS}	Drain-Source Leakage Current	V_{DS}=650V, V_{GS}=0V	-	-	10	uA
I_{GSSF}	Gate-Source Forward Leakage	V_{gsf}=30V, V_{DS}=0V	-	-	100	nA
I_{GSSR}	Gate-Source Reverse Leakage	V_{gsr}=-30V, V_{DS}=0V	-	-	-100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	2	-	4	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=5.0A*4	-	0.72	0.86	Ω
g_{FS}	Forward Transconductance	V_{DS}=40V, I_D=5.0A		5	-	S
C_{iss}	Input Capacitance	V_{DS}=25V, V_{GS}=0V, f=1MHz	-	1430	-	pF
C_{oss}	Output Capacitance		-	117	-	
C_{rss}	Reverse Transfer Capacitance		-	2.2	-	
$t_{d(on)}$	Turn-on Delay Time	(V_{DD}=325V, I_D=10A, R_G=10Ω, R_D=32Ω)*4	-	47	-	ns
t_r	Rise Time		-	75	-	
$t_{d(off)}$	Turn-off Delay Time		-	345	-	
t_f	Fall Time		-	67	-	
Q_g	Total Gate Charge	(V_{DS}=525V, I_D=10A, V_{GS}=10V)*4	-	44		nC
Q_{gs}	Gate-Source Charge		-	10		
Q_{gd}	Gate-Drain Charge		-	16		

Source-Drain Diode

Symbol	Characteristic		Min.	Typ.	Max.	Units
I_S	Continuous Source Current (Body Diode)	Page1 MOSFET symbol showing the integral reverse P-N junction diode.	-	-	10	A
V_{SD}	Diode Forward Voltage	I_S=10A, V_{GS}=0V, T_J=25°C*4	-	-	1.4	V

*4: Pulse Test: Pulse Width≤300us, Duty Cycle≤2%
*5: C_{OSS} eff. Is a fixed capacitance that gives the same charging time as C_{OSS} while V_{DS} is rising from 0 to 80% V_{DSS}

Characteristics Curve

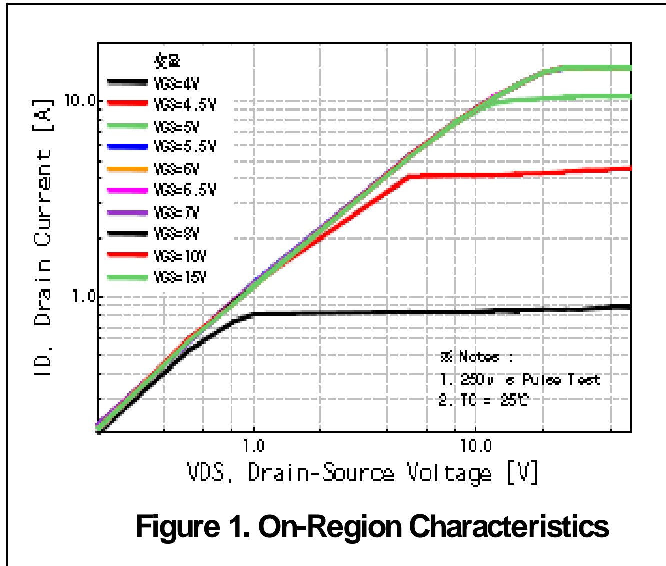


Figure 1. On-Region Characteristics

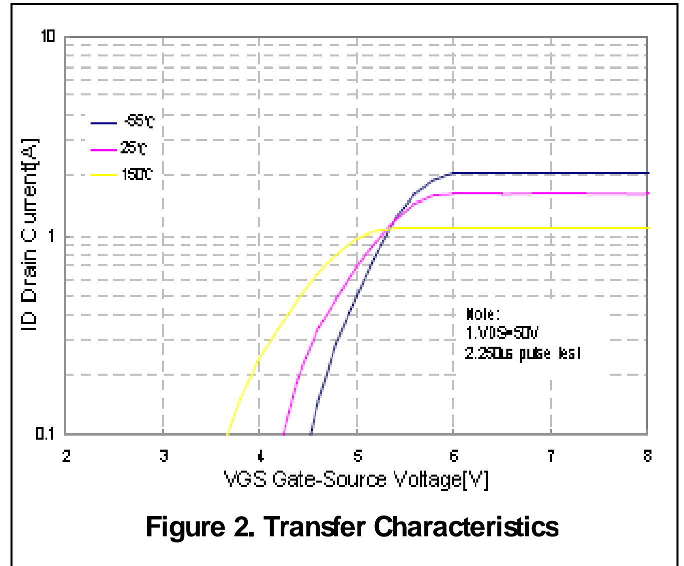


Figure 2. Transfer Characteristics

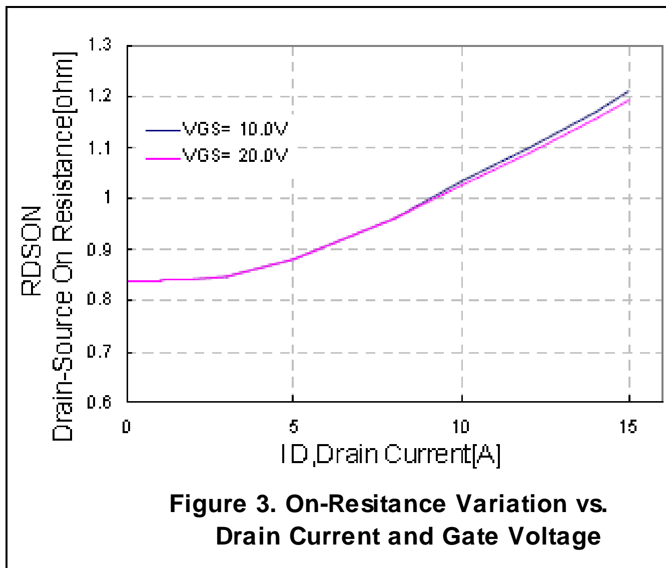


Figure 3. On-Resitance Variation vs. Drain Current and Gate Voltage

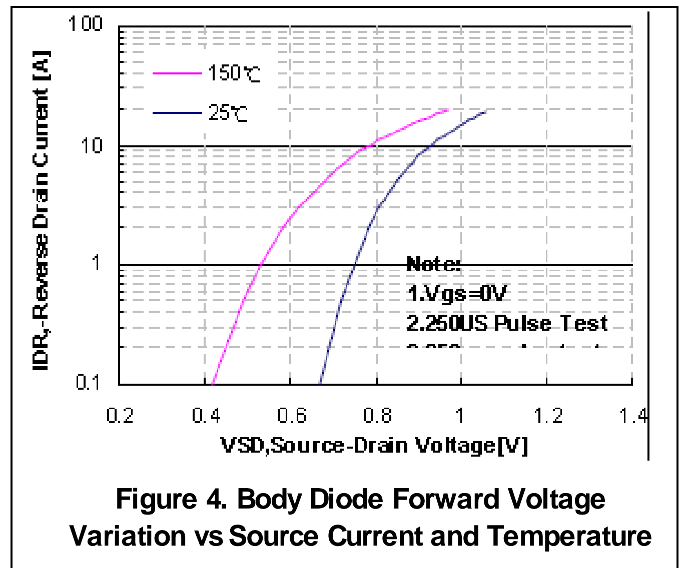


Figure 4. Body Diode Forward Voltage Variation vs Source Current and Temperature

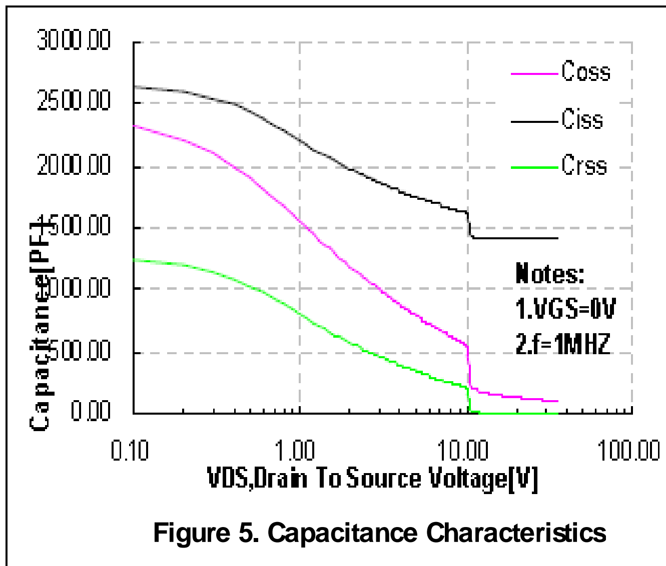


Figure 5. Capacitance Characteristics

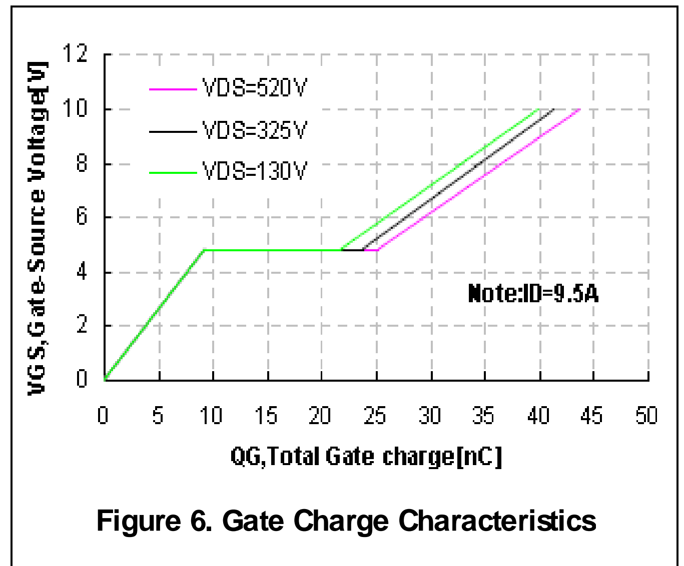


Figure 6. Gate Charge Characteristics

Characteristics Curve

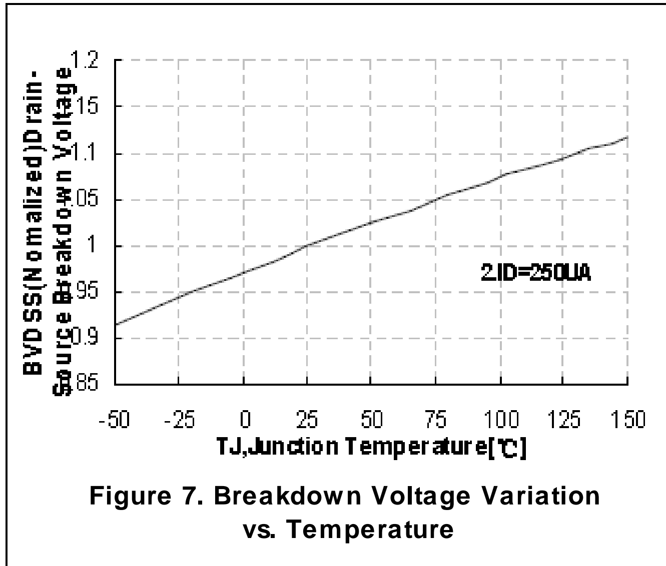


Figure 7. Breakdown Voltage Variation vs. Temperature

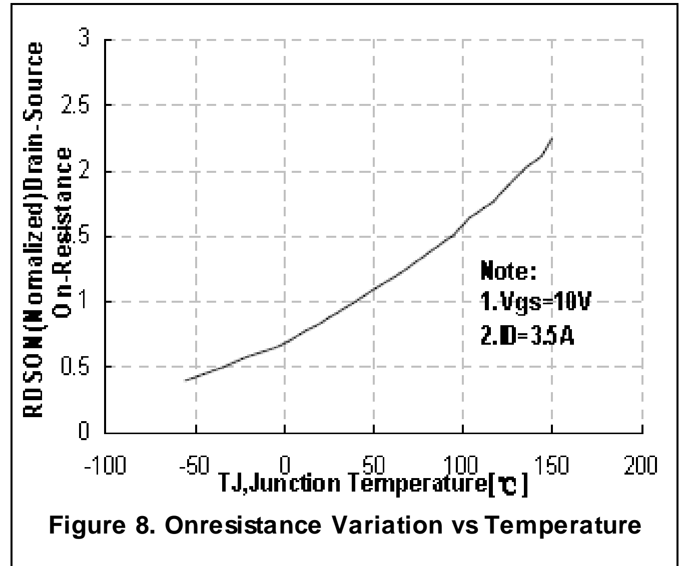
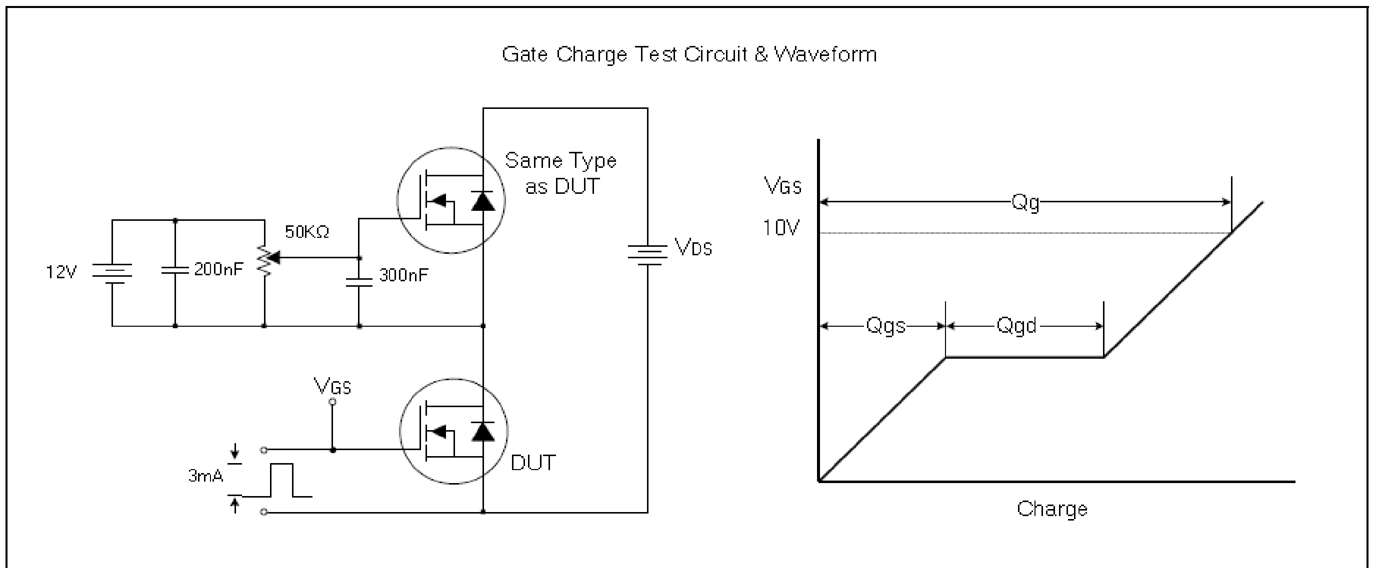


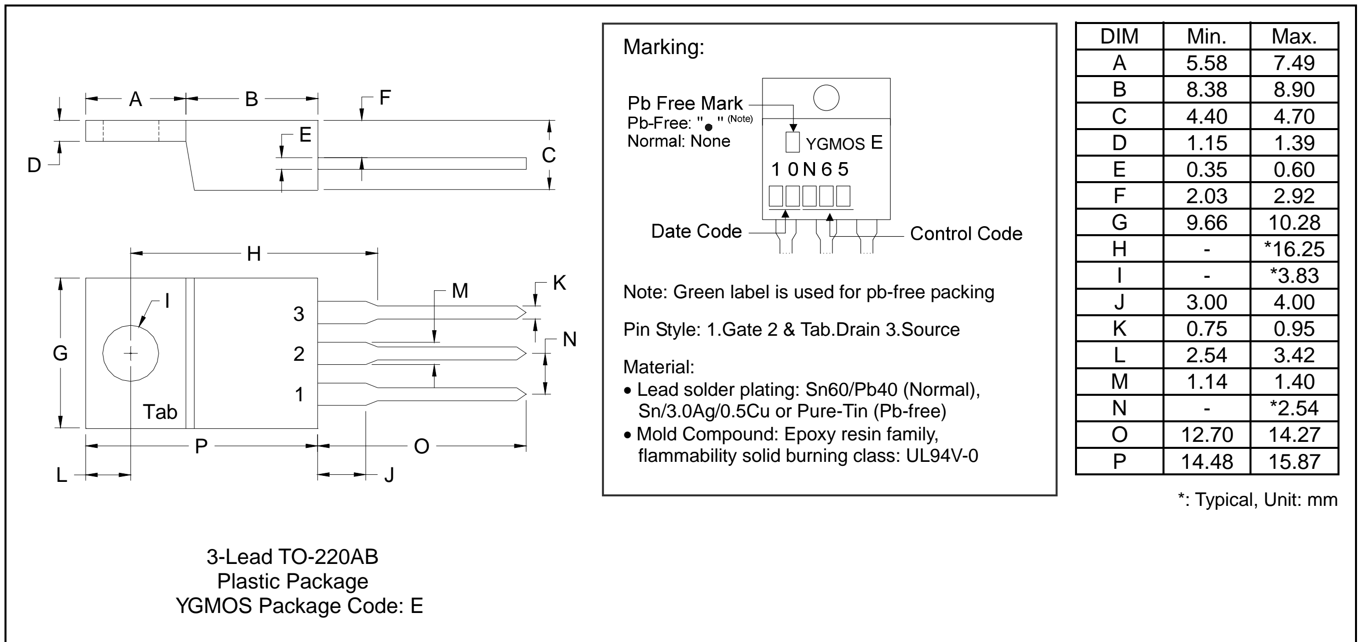
Figure 8. Onresistance Variation vs Temperature



Resistive Switching Test Circuit & Waveform

VDS
RL
VGS
VDD
RG
DUT
10V
VDS
90%
10%
VGS
td(on)
tr
ton
td(off)
tf
toff

TO-220AB Dimension

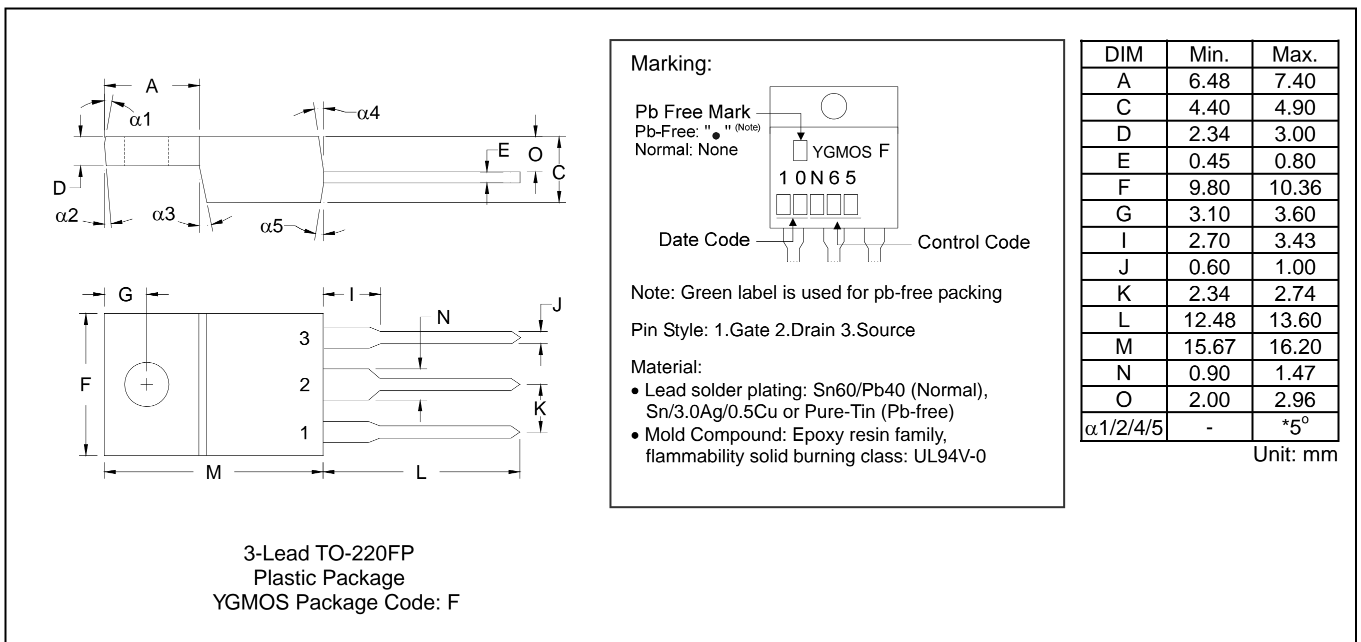


DIM	Min.	Max.
A	5.58	7.49
B	8.38	8.90
C	4.40	4.70
D	1.15	1.39
E	0.35	0.60
F	2.03	2.92
G	9.66	10.28
H	-	*16.25
I	-	*3.83
J	3.00	4.00
K	0.75	0.95
L	2.54	3.42
M	1.14	1.40
N	-	*2.54
O	12.70	14.27
P	14.48	15.87

*: Typical, Unit: mm

3-Lead TO-220AB
Plastic Package
YGMOS Package Code: E

TO-220FP Dimension



DIM	Min.	Max.
A	6.48	7.40
C	4.40	4.90
D	2.34	3.00
E	0.45	0.80
F	9.80	10.36
G	3.10	3.60
I	2.70	3.43
J	0.60	1.00
K	2.34	2.74
L	12.48	13.60
M	15.67	16.20
N	0.90	1.47
O	2.00	2.96
α1/2/4/5	-	*5°

Unit: mm

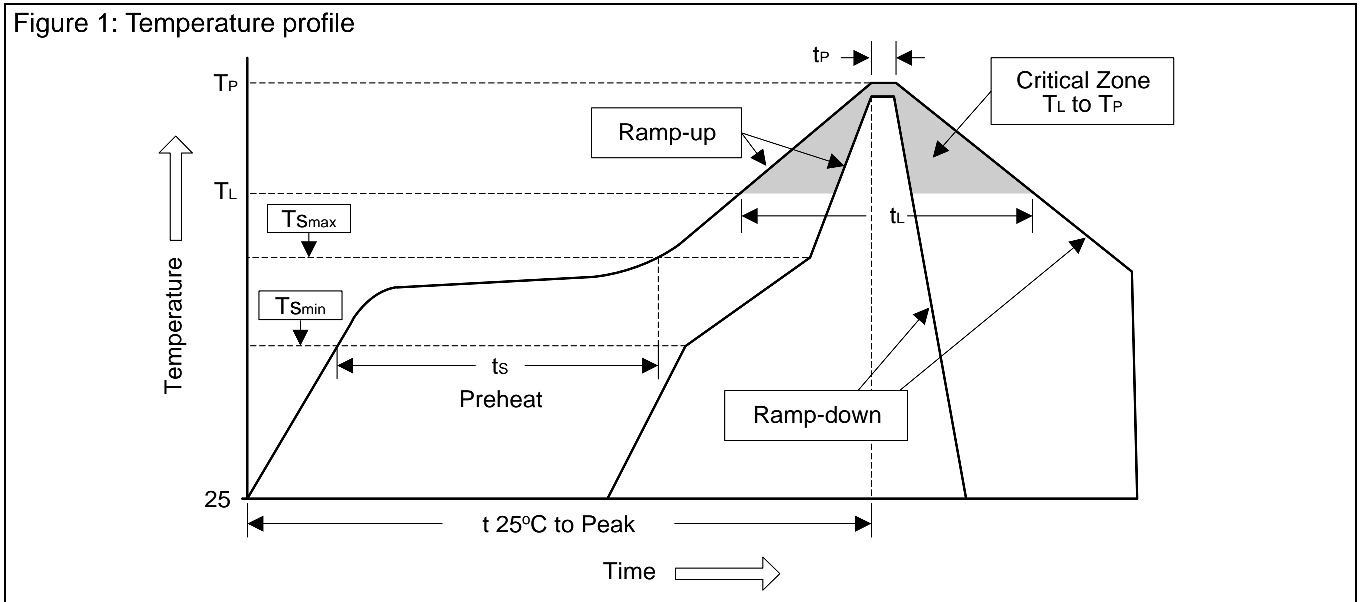
3-Lead TO-220FP
Plastic Package
YGMOS Package Code: F

Soldering Methods for YGMOS's Products

1. Storage environment: Temperature=10°C~35°C Humidity=65%±15%

2. Reflow soldering of surface-mount devices

Figure 1: Temperature profile



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	<3°C/sec	<3°C/sec
Preheat - Temperature Min (Ts_{min}) - Temperature Max (Ts_{max}) - Time (min to max) (ts)	 100°C 150°C 60~120 sec	 150°C 200°C 60~180 sec
Tsmax to T_L - Ramp-up Rate	 <3°C/sec	 <3°C/sec
Time maintained above: - Temperature (T_L) - Time (t_L)	 183°C 60~150 sec	 217°C 60~150 sec
Peak Temperature (T_P)	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature (t_P)	10~30 sec	20~40 sec
Ramp-down Rate	<6°C/sec	<6°C/sec
Time 25°C to Peak Temperature	<6 minutes	<8 minutes

3. Flow (wave) soldering (solder dipping)

Products	Peak temperature	Dipping time
Pb devices.	245°C ±5°C	5sec ±1sec
Pb-Free devices.	260°C +0/-5°C	5sec ±1sec