

Features

- Low power loss by high speed switching and low on-resistance
- Excellent thermal behavior
- HBM: JESD22-A114-B: 1B
- Product validation acc. JEDEC Standard

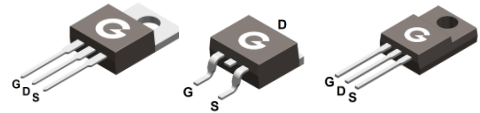
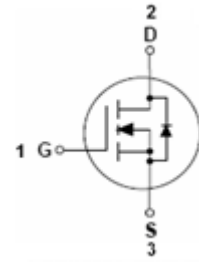
HF

APPLICATIONS

- PFC power supply stages
- Solar inverter
- Telecom
- Server
- UPS

Mechanical Data

- Case: TO-220AB, TO-263, ITO-220AB
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208



TO-220AB

TO-263

ITO-220AB

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
SJ60R180	TO-220AB	50 pcs / Tube	SJ60R180
SJ60R180B	TO-263	50 pcs / Tube or 800 pcs / Tape & Reel	SJ60R180B
SJ60R180F	ITO-220AB	50 pcs / Tube	SJ60R180F

Maximum Ratings (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	600	V
Gate-to-Source Voltage	V_{GSS}	± 30	V
Continuous Drain Current ($T_C = 25^\circ\text{C}$)	I_D	21	A
Continuous Drain Current ($T_C = 100^\circ\text{C}$)		13.2	A
Pulsed Drain Current ($t_p = 10\mu\text{s}$, $T_C = 25^\circ\text{C}$)	I_{DM}	84	A
Single Pulse Avalanche Energy ²	E_{AS}	500	mJ
Power Dissipation (TO-220AB, $T_C = 25^\circ\text{C}$)	P_D	208	W
Power Dissipation (TO-263, $T_C = 25^\circ\text{C}$)		208	W
Power Dissipation (ITO-220AB, $T_C = 25^\circ\text{C}$)		36	W
Operating Junction Temperature Range	T_J	-55 ~ +150	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-55 ~ +150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance Junction-to-Case (TO-220AB, TO-263)	R _{θJC}	-	0.41	0.6	°C/W
Thermal Resistance Junction-to-Case (ITO-220AB)		-	3.1	3.5	°C/W
Thermal Resistance Junction-to-Air (TO-220AB, TO-263)	R _{θJA}	-	-	50	°C/W
Thermal Resistance Junction-to-Air (ITO-220AB)		-	-	62.5	°C/W

Electrical Characteristics (@ T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
V _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA	600	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 600V, V _{GS} = 0V	-	-	1	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} = ±30V, V _{DS} = 0V	-	-	±100	nA
On Characteristics						
R _{DS(ON)}	Drain-Source On-resistance *1	V _{GS} = 10V, I _D = 10A	-	0.14	0.18	Ω
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	2	3	4	V
R _G	Gate Resistance	V _{GS} = 0V, f = 1MHz	-	4.4	-	Ω
Dynamic Characteristics						
C _{ISS}	Input Capacitance	V _{GS} = 0V V _{DS} = 40V f = 250kHz	-	1579	-	pF
C _{OSS}	Output Capacitance		-	111	-	
C _{RSS}	Reverse Transfer Capacitance		-	4	-	
Switching Characteristics						
t _{d(ON)}	Turn-on Delay Time *3	V _{DD} = 400V V _{GS} = 10V I _D = 7A	-	64	-	ns
t _r	Turn-on Rise Time *3		-	16	-	
t _{d(OFF)}	Turn-Off Delay Time *3		-	55	-	
t _f	Turn-Off Fall Time *3		-	14	-	
Q _G	Total Gate-Charge	V _{DD} = 520V V _{GS} = 10V I _D = 10A	-	39	-	nC
Q _{GS}	Gate to Source Charge		-	5	-	
Q _{GD}	Gate to Drain (Miller) Charge		-	14	-	
Source-Drain Diode Characteristics						
V _{SD}	Diode Forward Voltage *1	I _{SD} = 10A, V _{GS} = 0V	-	0.84	1.2	V
t _{rr}	Reverse Recovery Time	I _F = 1A, V _R = 400V	-	138	-	ns
Q _{rr}	Reverse Recovery Charge	di/dt = 100A/μs	-	0.79	-	μC

Notes:

- The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
- The E_{AS} data shows Max. rating. The test condition is V_{DD} = 100V, V_{GS} = 15V, L = 50mH
- Guaranteed by design, not subject to production

Ratings and Characteristics Curves (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)

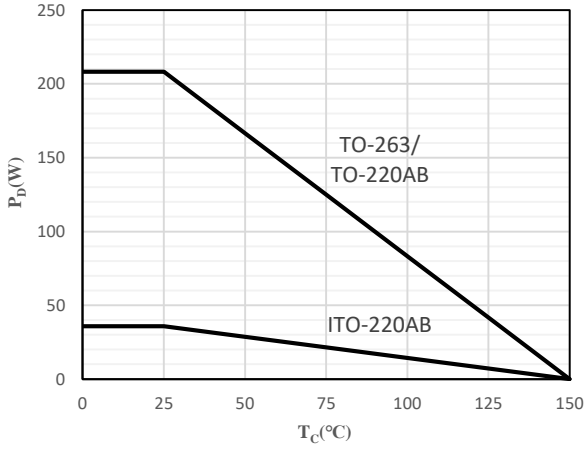


Fig 1 Power Dissipation

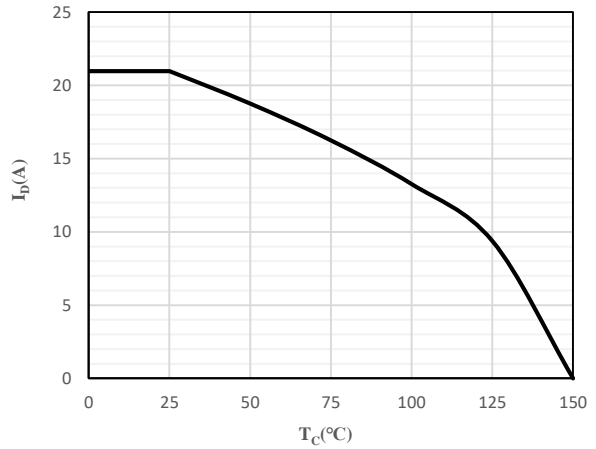


Fig 2 Drain Current

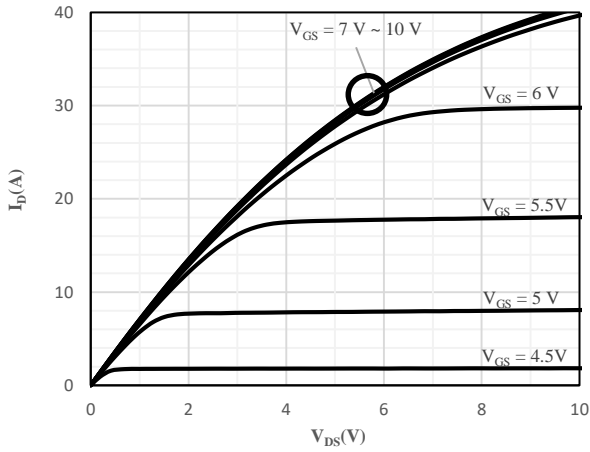


Fig 3 Typical Output Characteristics

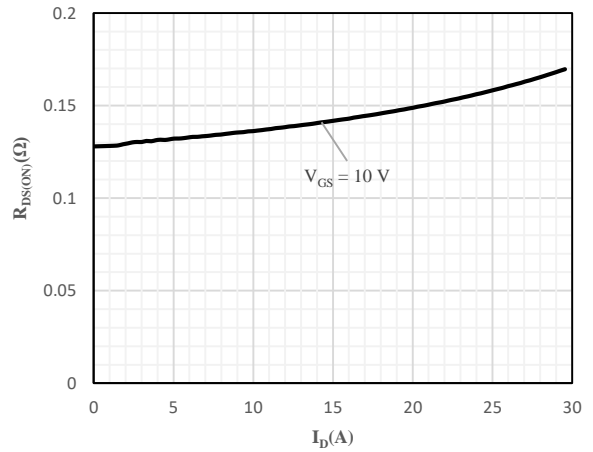


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

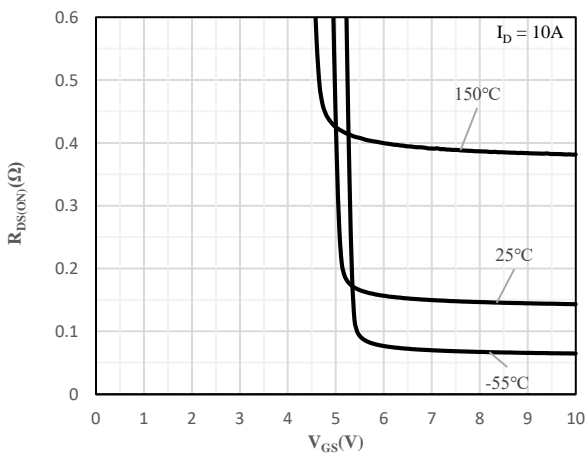


Fig 5 On-Resistance vs. Gate-Source Voltage

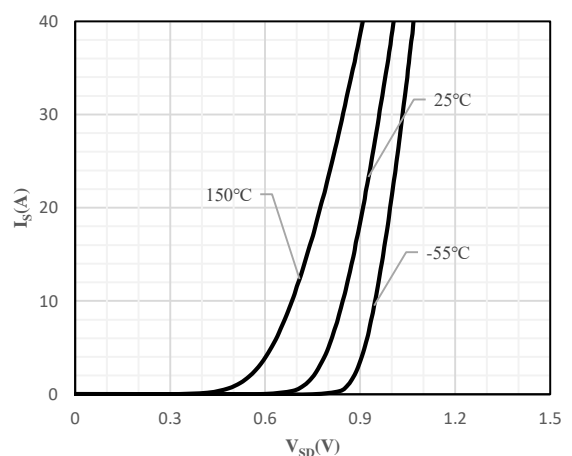


Fig 6 Body-Diode Characteristics

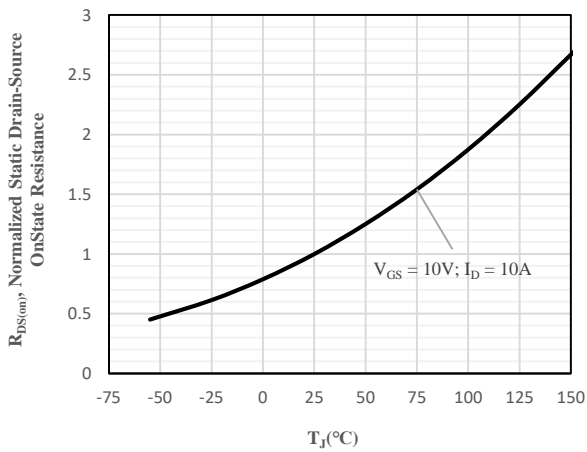


Fig 7 Normalized On-Resistance vs. Junction Temperature

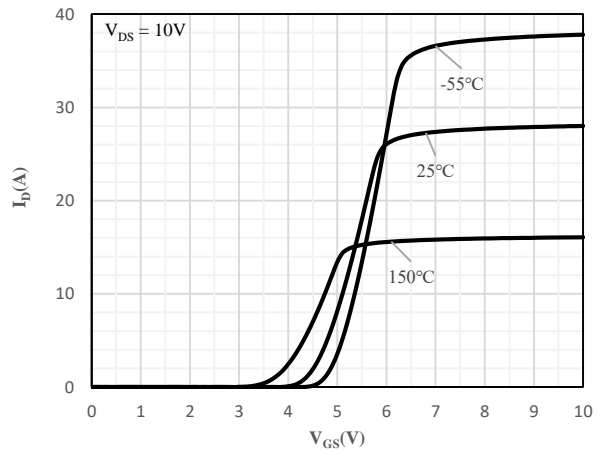


Fig 8 Transfer Characteristics

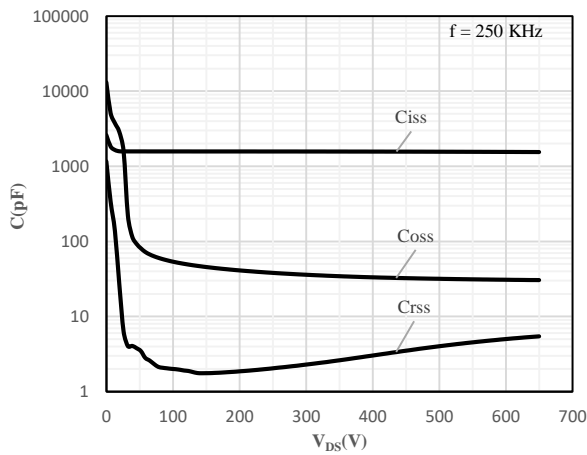


Fig 9 Capacitance Characteristics

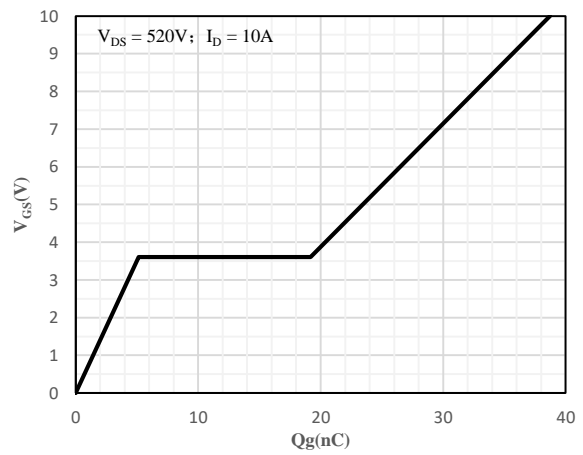


Fig 10 Gate-Charge Characteristics

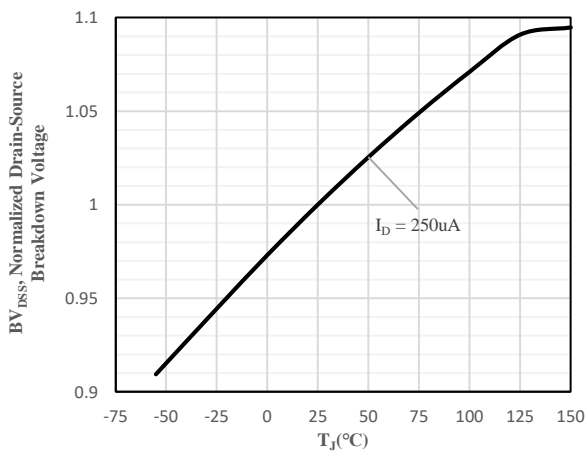


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

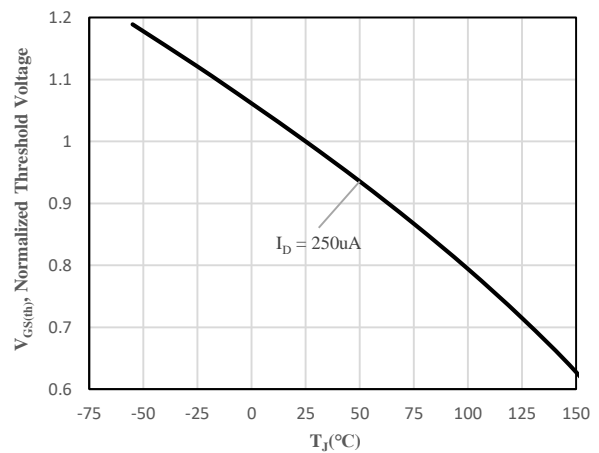


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

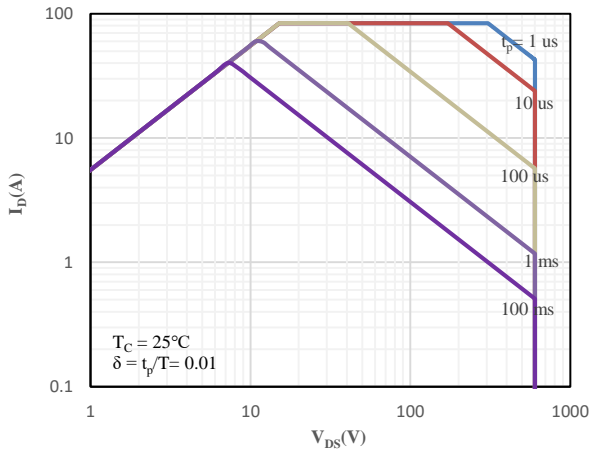


Fig 13 Safe Operation Area (TO-220AB / TO-263)

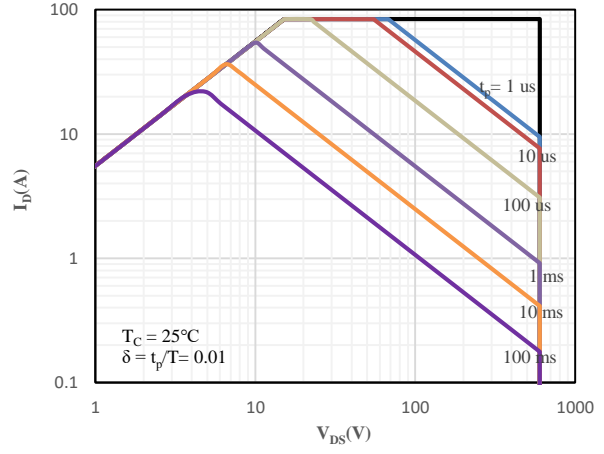


Fig 14 Safe Operation Area (ITO-220AB)

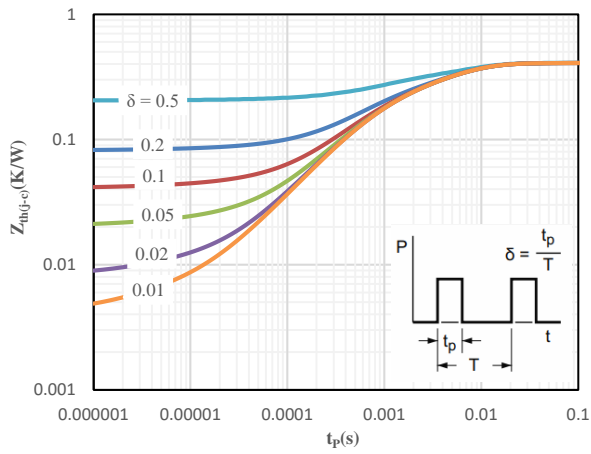


Fig 15 Maximum transient thermal impedance (TO-220AB / TO-263)

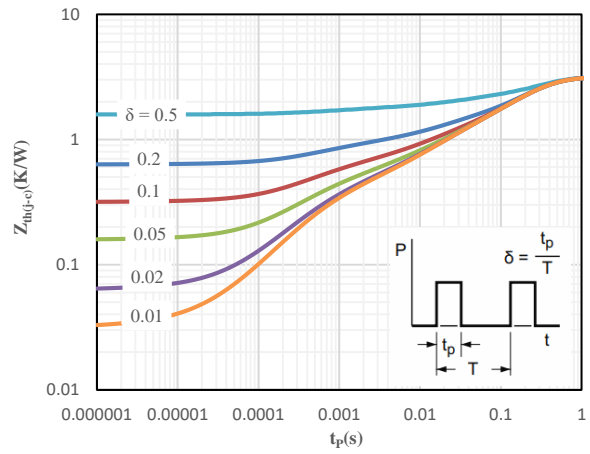
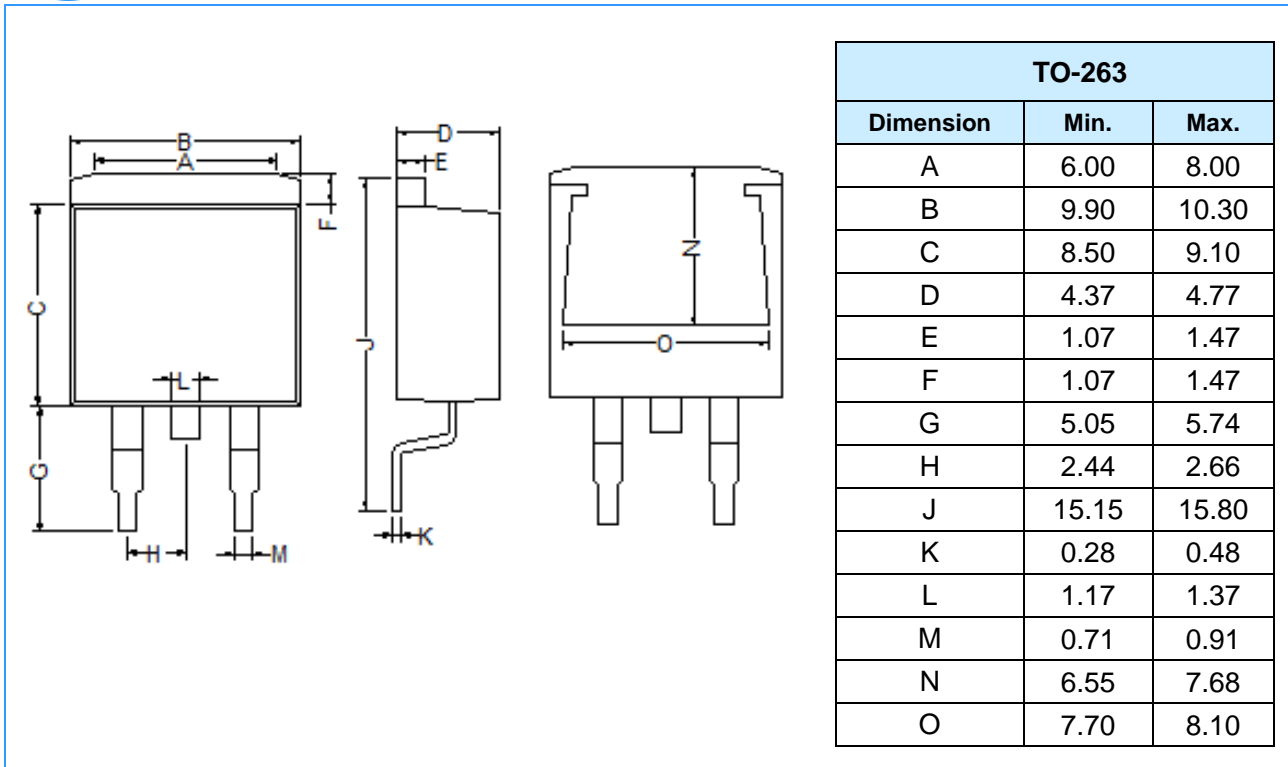


Fig 16 Maximum transient thermal impedance (ITO-220AB)

Package Outline Dimensions (Unit: mm)

TO-220AB	
Dimension	Min. / Max.
A	9.80 / 10.30
B	8.70 / 9.10
C	4.37 / 4.77
D	1.07 / 1.47
E	2.64 / 2.84
F	13.14 / 13.74
G	2.44 / 2.64
H	28.03 / 28.83
I	3.50 / 4.00
J	0.28 / 0.48
K	1.22 / 1.32
L	0.71 / 0.91
M	2.40 / 2.60
N	3.76 / 3.96

ITO-220AB	
Dimension	Min. / Max.
A	9.90 / 10.30
B	14.80 / 15.20
C	4.30 / 4.70
D	2.50 / 2.90
E	2.80 / 3.30
F	13.00 / 13.60
G	3.10 / 3.30
H	28.00 / 28.60
I	7.90 / 8.90
J	0.40 / 0.60
L	0.70 / 0.90
M	1.30 / 1.50
N	2.60 / 2.80
O	2.60 / 3.10
P	2.45 / 2.65
K/R	1.10 / 1.30



Mounting Pad Layout (Unit: mm)

