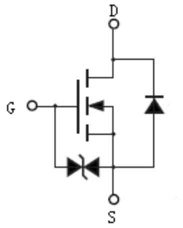
Super Junction Power MOSFET

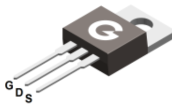
SJM80R1K4 SJM80R1K4B SJM80R1K4F

Features

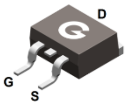
- Low power loss by high speed switching and low on-resistance
- Excellent thermal behavior
- Very low FOM for fast switching efficiency
- Product validation acc. JEDEC Standard
- Integrated ESD protection diode：HBM: JESD22-A114-B: 2
- RoHS compliant with Halogen-free

HF

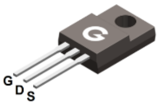




TO-220AB



TO-263



ITO-220AB

Applications

- LED lighting
- Adapters
- Chargers
- Industrial power
- PFC stage

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

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
SJM80R1K4	TO-220AB	50 pcs / Tube	SJM80R1K4
SJM80R1K4B	TO-263	50 pcs / Tube or 800 pcs / Tape & Reel	SJM80R1K4B
SJM80R1K4F	ITO-220AB	50 pcs / Tube	SJM80R1K4F

Maximum Ratings (@ T_C = 25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	800	V
Gate-to-Source Voltage (Static)	V_{GSS}	±20	V
Continuous Drain Current (T_C = 25°C)	I_D	4	A
Continuous Drain Current (T_C = 100°C)		2.5	A
Pulsed Drain Current (t_p = 10μs, T_C = 25°C)	I_{DM}	16	A
Single Pulse Avalanche Energy ^{*2}	E_{AS}	75	mJ
Power Dissipation (TO-220AB, T_C = 25°C)	P_D	50	W
Power Dissipation (TO-263, T_C = 25°C)		50	W
Power Dissipation (ITO-220AB, T_C = 25°C)		25	W
Operating Junction Temperature Range	T_J	-55 ~ +150	°C
Storage Temperature Range	T_{STG}	-55 ~ +150	°C

Thermal Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance Junction-to-Case (TO-220AB, TO-263)	$R_{\theta JC}$	-	2	2.5	°C/W
Thermal Resistance Junction-to-Case (ITO-220AB)		-	3.9	5	°C/W
Thermal Resistance Junction-to-Air (TO-220AB, TO-263)	$R_{\theta JA}$	-	-	62	°C/W
Thermal Resistance Junction-to-Air (ITO-220AB)		-	-	75	°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	800	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 800V, V_{GS} = 0V	-	-	1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS} = ±20V, V_{DS} = 0V	-	-	±1	μA
On Characteristics						
$R_{DS(ON)}$	Drain-Source On-resistance *1	V_{GS} = 10V, I_D = 1A	-	1.1	1.4	Ω
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	2	3.1	4	V
R_G	Gate Resistance	V_{GS} = 0V, f = 1MHz	-	6.6	-	Ω
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{GS} = 0V V_{DS} = 40V f = 250kHz	-	382	-	pF
C_{OSS}	Output Capacitance		-	35	-	
C_{RSS}	Reverse Transfer Capacitance		-	1.7	-	
Switching Characteristics						
$t_{d(ON)}$	Turn-on Delay Time *3	V_{DD} = 400V I_D = 2A R_G = 25Ω	-	19	-	ns
t_r	Turn-on Rise Time *3		-	18	-	
$t_{d(OFF)}$	Turn-Off Delay Time *3		-	50	-	
t_f	Turn-Off Fall Time *3		-	19	-	
Q_G	Total Gate-Charge	V_{DD} = 640V V_{GS} = 10V I_D = 2A	-	14.7	-	nC
Q_{GS}	Gate to Source Charge		-	3.7	-	
Q_{GD}	Gate to Drain (Miller) Charge		-	5.2	-	
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage *1	I_{SD} = 2A, V_{GS} = 0V	-	0.84	1.3	V
t_{rr}	Reverse Recovery Time	I_F = 1A, V_R = 400V d_i/d_t = 100A/μs	-	200	-	ns
Q_{rr}	Reverse Recovery Charge		-	1.0	-	μC

Notes:

1. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
2. The E_{AS} data shows Max. rating. The test condition is V_{DD} = 100V, V_{GS} = 10V, L = 50mH
3. Guaranteed by design, not subject to production

Ratings and Characteristics Curves (@ T_A = 25°C unless otherwise specified)

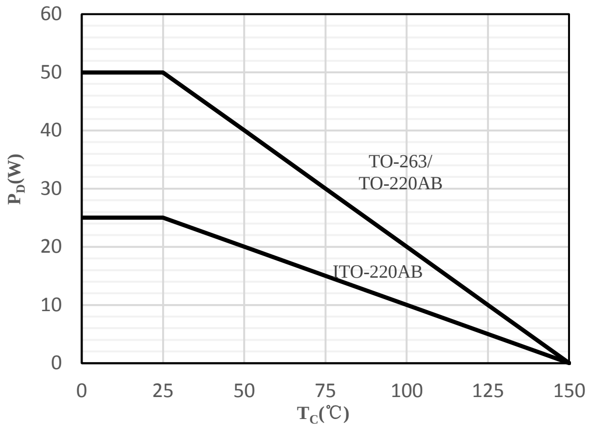


Fig 1 Power Dissipation

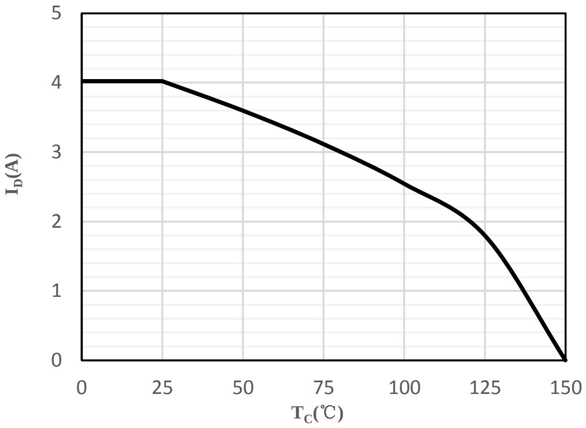


Fig 2 Drain Current

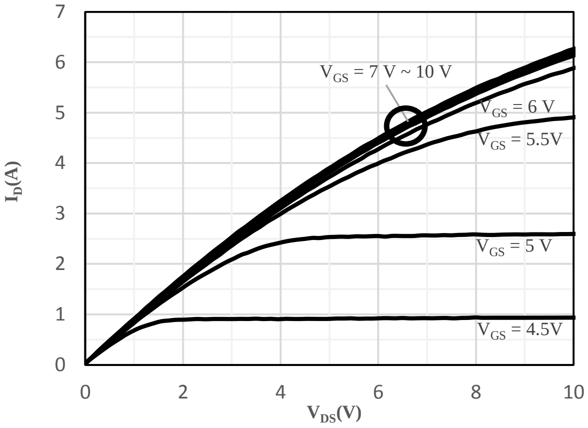


Fig 3 Typical Output Characteristics

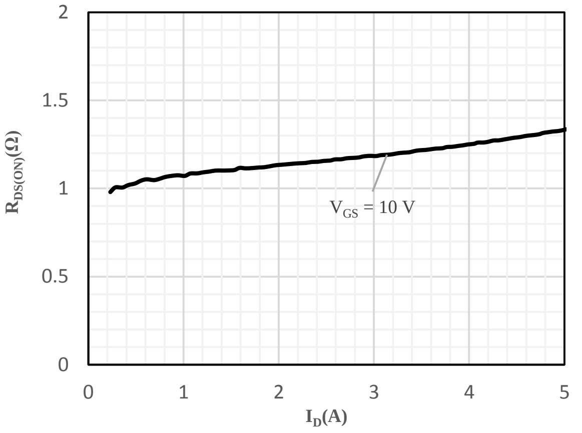


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

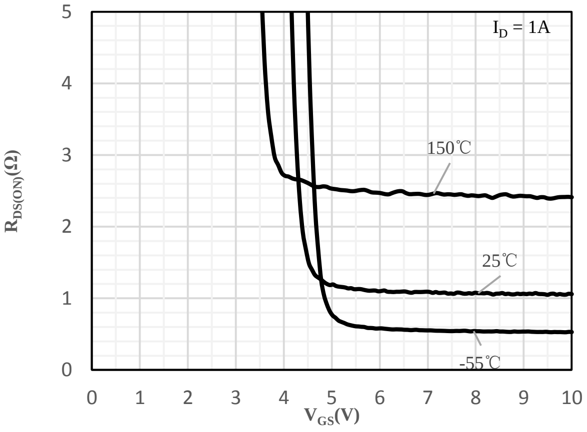


Fig 5 On-Resistance vs. Gate-Source Voltage

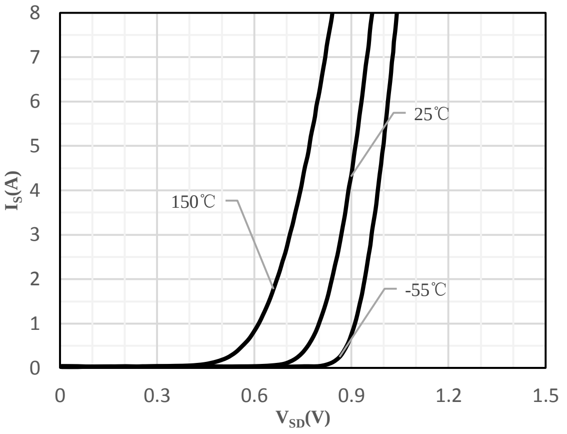


Fig 6 Body-Diode Characteristics

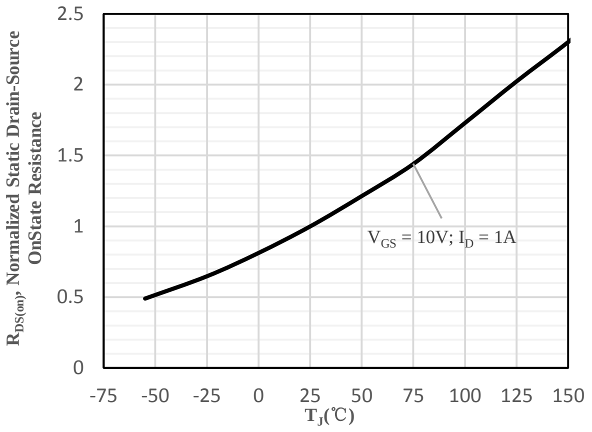


Fig 7 Normalized On-Resistance vs. Junction Temperature

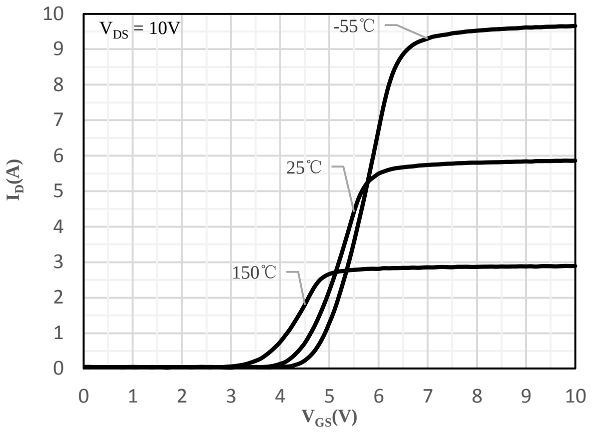


Fig 8 Transfer Characteristics

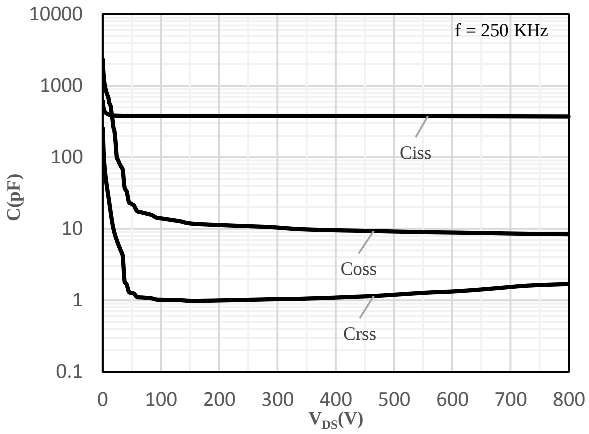


Fig 9 Capacitance Characteristics

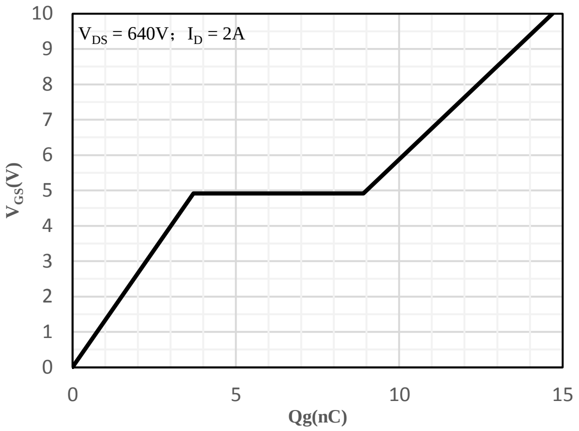


Fig 10 Gate-Charge Characteristics

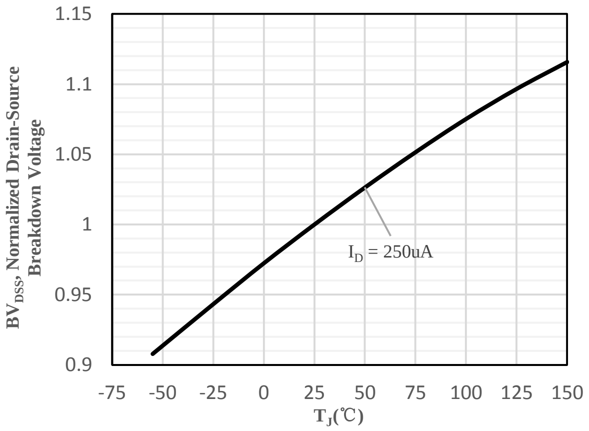


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

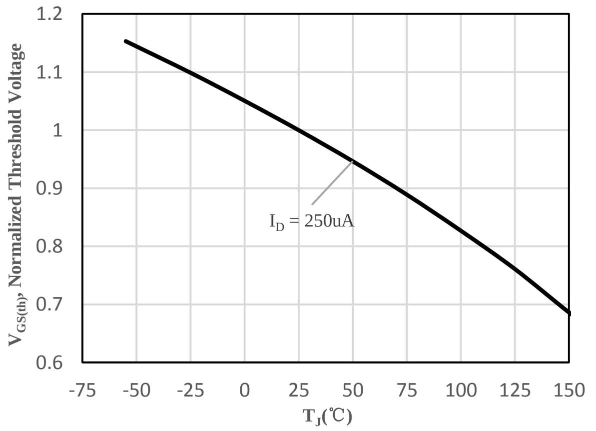


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

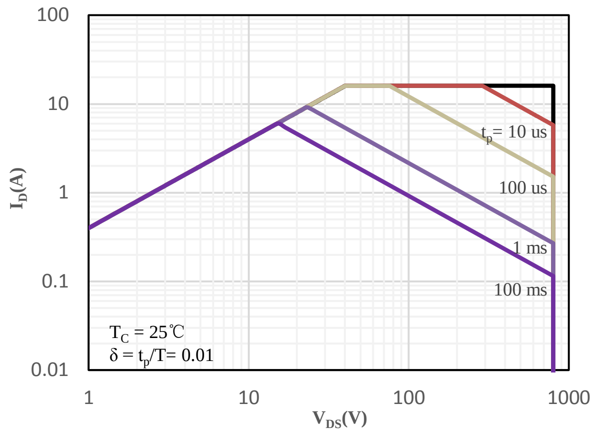


Fig 13 Safe Operating Area (TO-220AB / TO-263)

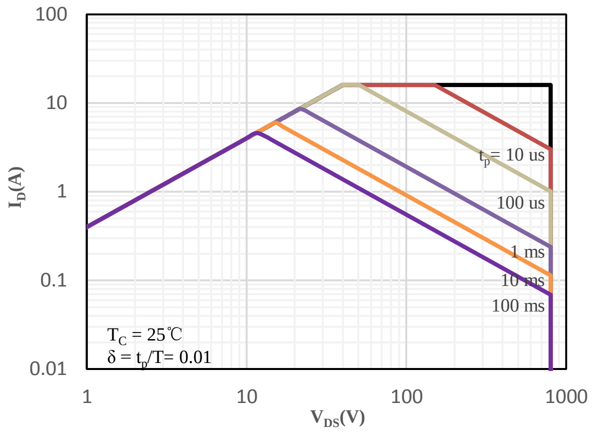


Fig 14 Safe Operating Area (ITO-220AB)

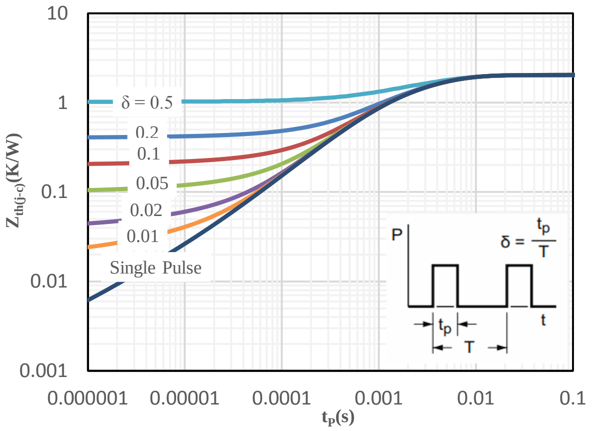


Fig 15 Maximum transient thermal impedance

(TO-220AB / TO-263)

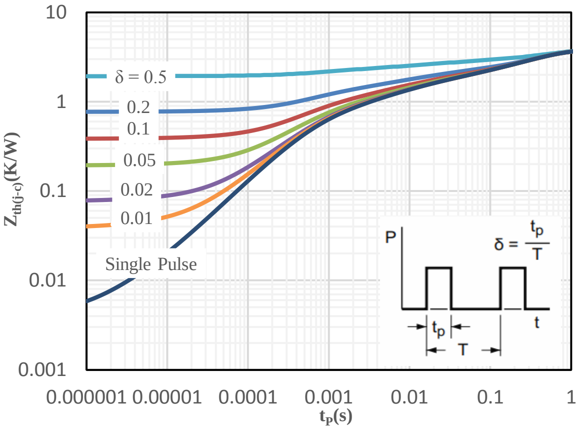
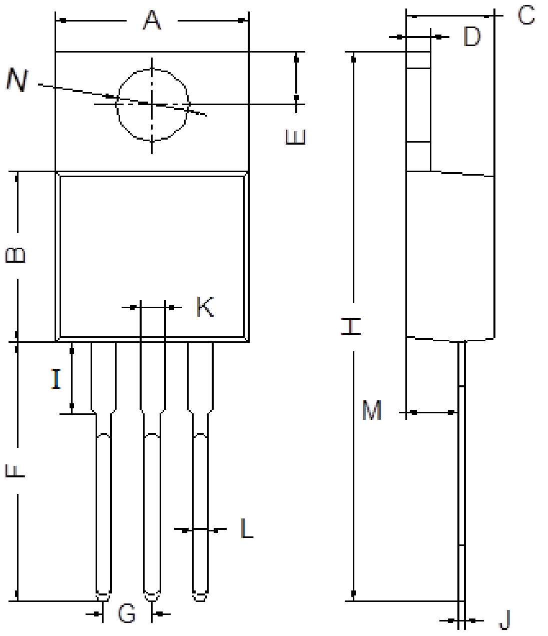


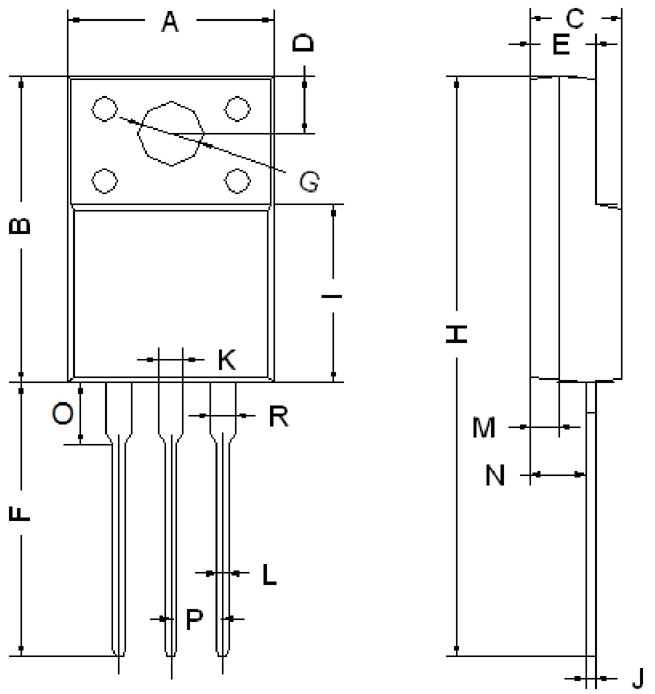
Fig 16 Maximum transient thermal impedance

(ITO-220AB)

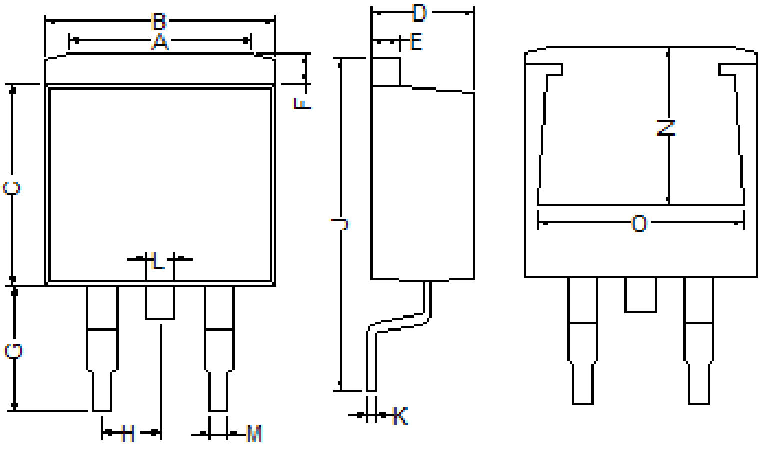
Package Outline Dimensions (Unit: mm)



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



TO-263		
Dimension	**Min.**	**Max.**
A	6.00	8.00
B	9.90	10.30
C	8.50	9.10
D	4.37	4.77
E	1.07	1.47
F	1.07	1.47
G	5.05	5.74
H	2.44	2.66
J	15.15	15.80
K	0.28	0.48
L	1.17	1.37
M	0.71	0.91
N	6.55	7.68
O	7.70	8.10

Mounting Pad Layout (Unit: mm)

TO-263