

PRELIMINARY

M63840P/FP/KP

8-Unit 500mA Source Type Darlington Transistor-Array With Clamp Diode

* Notice: This is not a final specification.
Some parametric limits are subject to change.

DESCRIPTION

M63840P/FP/KP are eight-circuit output-sourcing Darlington transistor array. The circuits are made of PNP and NPN transistors. Both the semiconductor integrated circuits perform high-current driving with extremely low input-current supply.

FEATURES

- High breakdown voltage ($BV_{CEO} \geq 40V$)
- High-current driving ($I_{O(max)} = -500mA$)
- With output clamping diodes
- Driving available with TTL output or C-MOS IC output
- Wide operating temperature range ($T_a = -40 \sim +85^\circ C$)
- Output current-sourcing type

APPLICATION

Drives of relays, printers, LEDs, fluorescent display tubes and lamps. and interfaces between MOS-bipolar logic systems and relays, solenoids, of small motors.

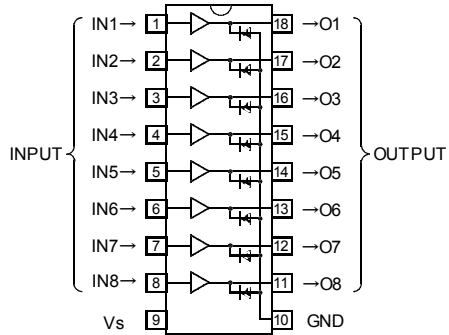
FUNCTION

The M63840P/FP/KP each have eight circuits, which are made of input inverters and current-sourcing outputs. The output are made of PNP transistors and NPN Darlington transistors. The PNP transistor base current is constant. A clamping diode is provided between each output and GND. V_s and GND are used commonly among the eight circuits.

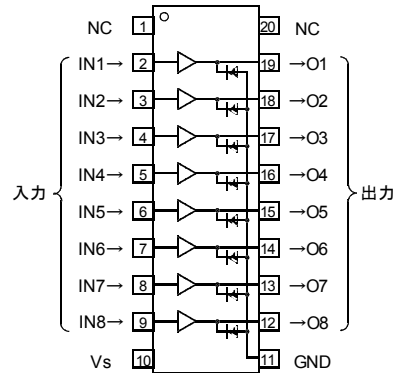
The inputs have resistance of $10k\Omega$, and voltage of up to 15V is applicable. Output current is 500mA maximum. Supply voltage V_s is 40V maximum.

The M63840FP/KP is enclosed in a molded small flat package, enabling space-saving design.

PIN CONFIGURATION (TOP VIEW)



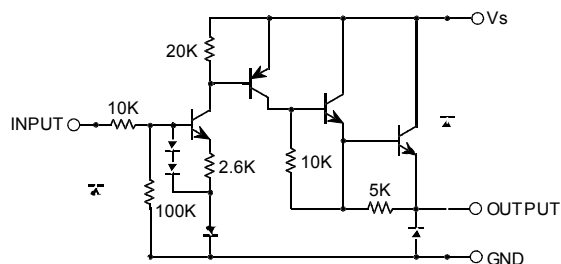
Package type 18P4G(P)



Package type 20P2N-A(FP)
20P2E-A(KP)

NC: No connection

CIRCUIT DIAGRAM (EACH CIRCUIT)



The eight circuits share V_s and GND.

The diode, indicated with the dotted line, is parasitic, and cannot be used.

Unit: Ω

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ABSOLUTE MAXIMUM RATINGS (Unless otherwise noted, Ta= -40~+85°C)

| Symbol | Parameter | Conditions | Ratings | Unit | |
|------------------|---------------------------------|---------------------------------|----------|------|---|
| V _{CEO} | Collector-emitter v oltage | Output, L | -0.5~+40 | V | |
| V _S | Supply v oltage | | 40 | V | |
| V _I | Input v oltage | | -0.5~+15 | V | |
| I _O | Output current | Current per circuit output, H | -500 | mA | |
| I _F | Clamping diode forward current | | -500 | mA | |
| V _R | Clamping diode reverse v oltage | | 35 | V | |
| P _d | Power dissipation | Ta= 25°C, when mounted on board | M63840P | 1.79 | W |
| | | | M63840FP | 1.10 | |
| | | | M63840KP | 0.68 | |
| T _{opr} | Operating temperature | | -40~+85 | °C | |
| T _{stg} | Storage temperature | | -55~+125 | °C | |

RECOMMENDED OPERATING CONDITIONS (Unless otherwise noted, Ta= -40~+85°C)

| Symbol | Parameter | Limits | | | Unit | |
|-----------------|--|---|-----|-----|------|----|
| | | min | typ | max | | |
| V _S | Supply v oltage | 0 | - | 40 | V | |
| I _O | Output current (Current per 1 circuit when 8 circuits are coming on simultaneously) | Duty Cycle P: no more then 10% FP: no more then 5% KP: no more then 3% | 0 | - | -350 | mA |
| | | Duty Cycle P: no more then 54% FP: no more then 30% KP: no more then 18% | 0 | - | -100 | |
| V _{IH} | "H" input v oltage | 2.0 | - | 12 | V | |
| V _{IL} | "L" input v oltage | 0 | - | 0.8 | V | |

ELECTRICAL CHARACTERISTICS (Unless otherwise noted, Ta= 25°C)

| Symbol | Parameter | Test conditions | Limits | | | Unit |
|----------------------|---------------------------------------|--|--------|-----|-----|------|
| | | | min | typ | max | |
| I _{S(leak)} | Supply leak current | V _S = 40V, V _I = 0.8V | - | - | 100 | μA |
| V _{CE(sat)} | Collector-emitter saturation v oltage | V _S = 10V, V _I = 2V, I _O = -350mA | - | 1.7 | 2.0 | V |
| | | V _S = 10V, V _I = 2V, I _O = -100mA | - | 1.5 | 1.8 | |
| I _I | Input current | V _I = 2.4V | - | 36 | 52 | μA |
| | | V _I = 3.85V | - | 180 | 260 | |
| I _S | Supply current | V _S = 40V, V _I = 2V (per 1 circuit) | - | - | 2.5 | mA |
| V _F | Clamping diode forward v oltage | I _F = 350mA | - | 1.3 | 2.0 | V |
| I _R | Clamping diode reverse current | V _R = 40V | - | - | 100 | μA |

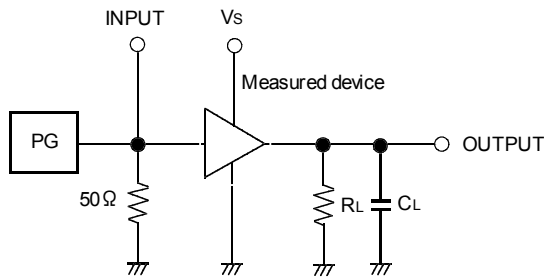
SWITCHING CHARACTERISTICS (Unless otherwise noted, Ta= 25°C)

| Symbol | Parameter | Test conditions | Limits | | | Unit |
|------------------|---------------|--------------------------------|--------|------|-----|------|
| | | | min | typ | max | |
| t _{on} | Turn-on time | C _L = 15pF (note 1) | - | 180 | - | ns |
| t _{off} | Turn-off time | | - | 2200 | - | ns |

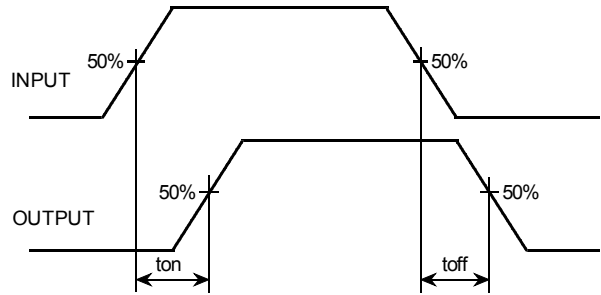
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NOTE 1 TEST CIRCUIT

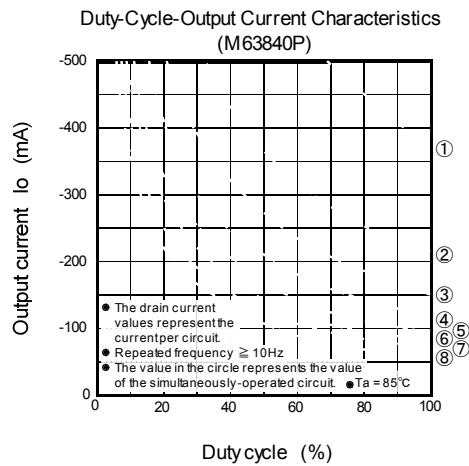
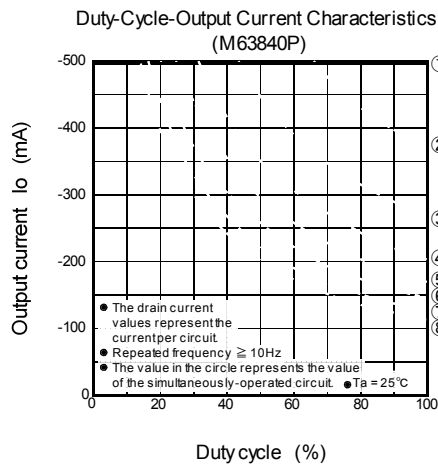
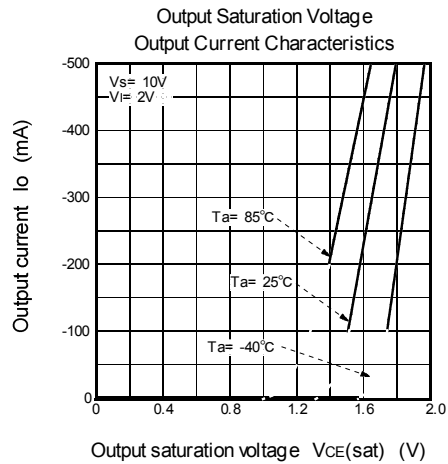
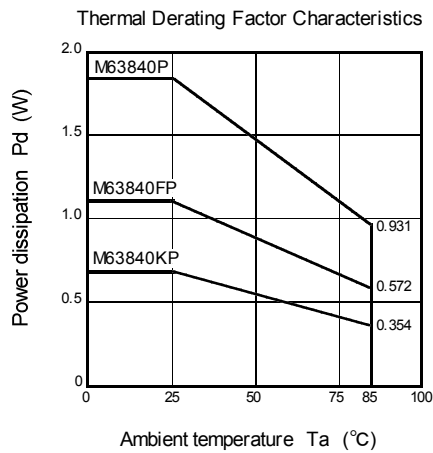


TIMING DIAGRAM



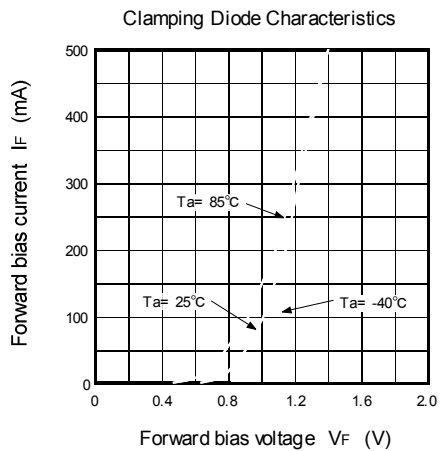
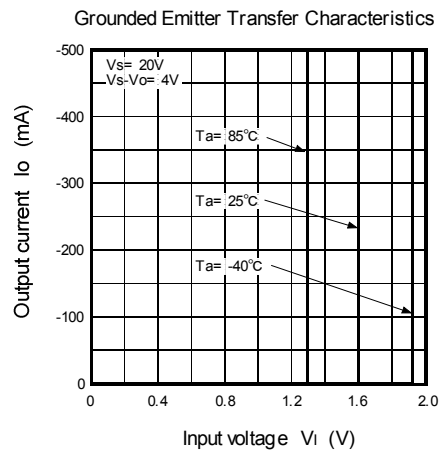
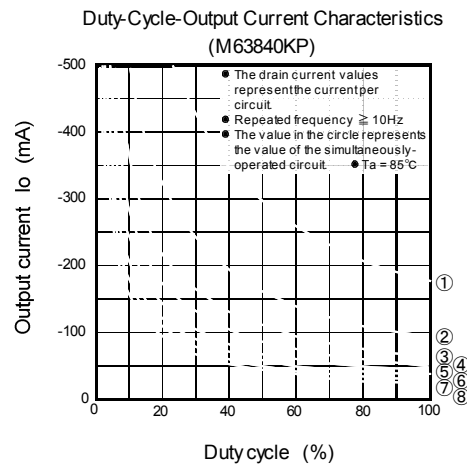
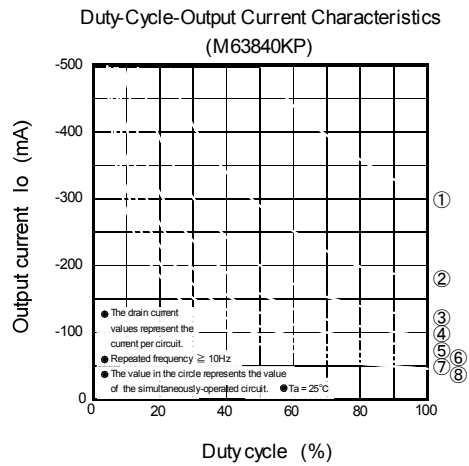
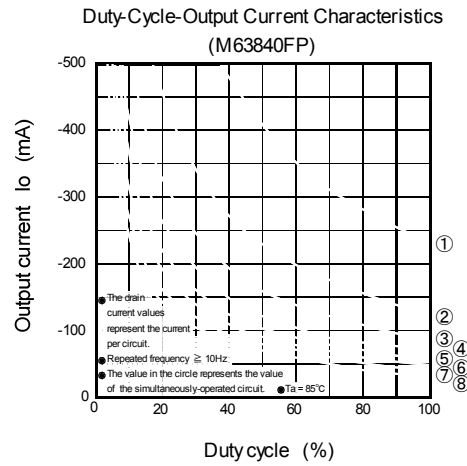
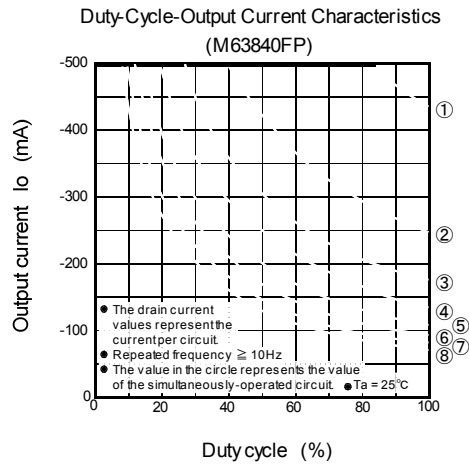
- (1) Pulse generator (PG) characteristics: PRR= 1KHz, $t_w = 10 \mu s$, $t_r = 6ns$, $t_f = 6ns$, $Z_o = 50 \Omega$, $V_i = 0 \sim 2.4V$
- (2) Input-output conditions: $R_L = 100 \Omega$, $V_s = 40V$
- (3) Electrostatic capacity C_L includes floating capacitance at connections and input capacitance at probes.

TYPICAL CHARACTERISTICS



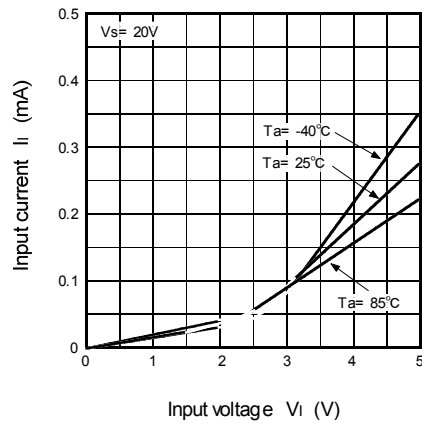
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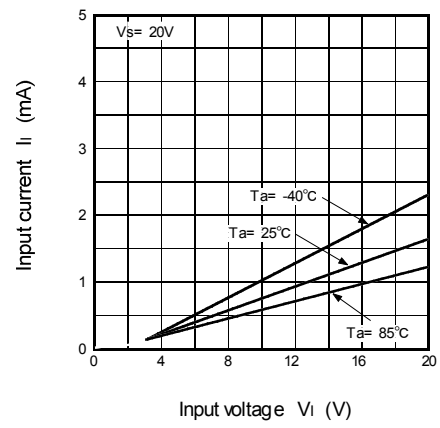


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Input Characteristics



Input Characteristics

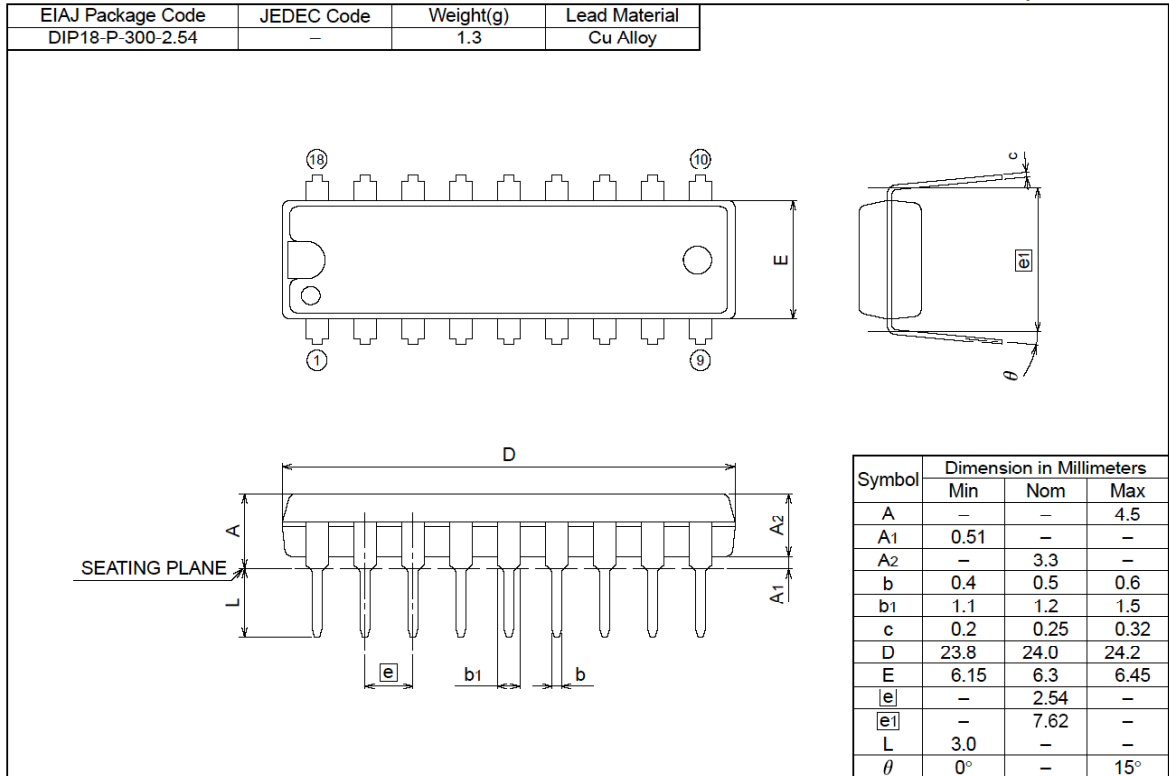


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18P4G

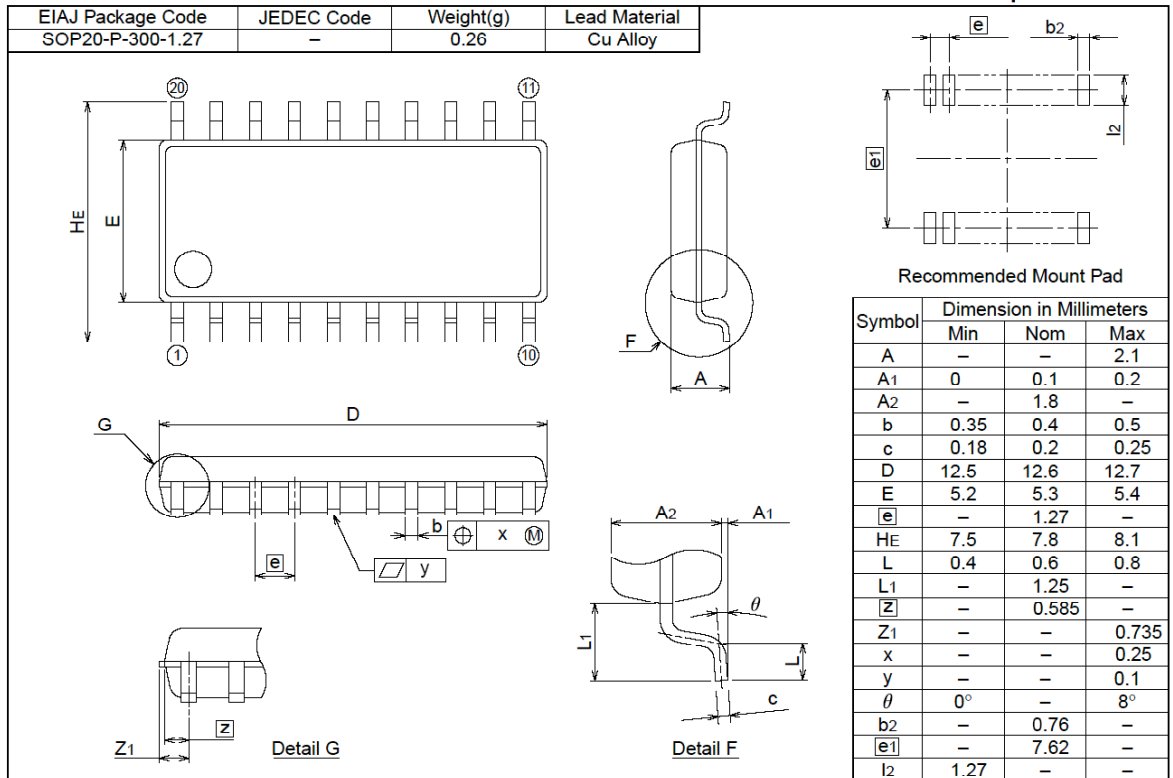
Plastic 18pin 300mil DIP



20P2N-A

(MMP)

Plastic 20pin 300mil SOP



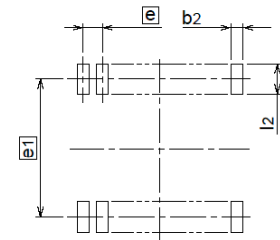
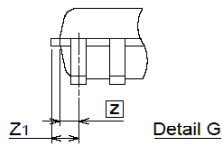
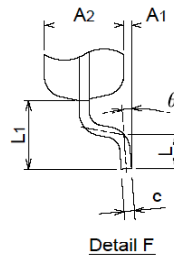
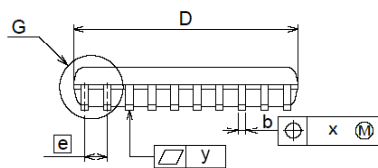
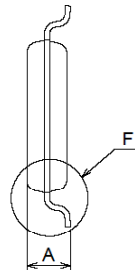
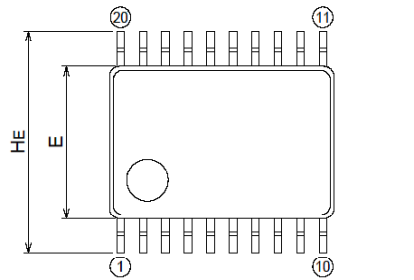
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20P2E-A

Plastic 20pin 225mil SSOP

| | | | |
|-------------------|------------|-----------|---------------|
| EIAJ Package Code | JEDEC Code | Weight(g) | Lead Material |
| SSOP20-P-225-0.65 | - | 0.08 | Alloy 42 |



Recommended Mount Pad

| Symbol | Dimension in Millimeters | | |
|----------|--------------------------|-------|-------|
| | Min | Nom | Max |
| A | - | - | 1.45 |
| A1 | 0 | 0.1 | 0.2 |
| A2 | - | 1.15 | - |
| b | 0.17 | 0.22 | 0.32 |
| c | 0.13 | 0.15 | 0.2 |
| D | 6.4 | 6.5 | 6.6 |
| E | 4.3 | 4.4 | 4.5 |
| e | - | 0.65 | - |
| HE | 6.2 | 6.4 | 6.6 |
| L | 0.3 | 0.5 | 0.7 |
| L1 | - | 1.0 | - |
| Z | - | 0.325 | - |
| Z1 | - | - | 0.475 |
| x | - | - | 0.13 |
| y | - | - | 0.1 |
| θ | 0° | - | 10° |
| b2 | - | 0.35 | - |
| e1 | - | 5.8 | - |
| l2 | 1.0 | - | - |