

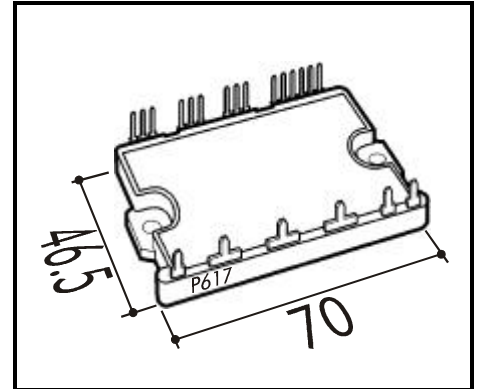
## Intelligent Power Module ( RH-Series )

### ■ Maximum Ratings and Characteristics

#### • Absolute Maximum Ratings ( $T_c=25^\circ\text{C}$ )

| Items   | Symbols         | Ratings    |          | Units |
|---|-----------------|------------|----------|-------|
|   |                 | Min.       | Max.     |       |
| DC Bus Voltage  | $V_{DC}$        | 0          | 450      | V     |
| DC Bus Voltage (surge)                                    | $V_{DC(Surge)}$ | 0          | 500      |       |
| DC Bus Voltage (short operating)                          | $V_{SC}$        |            | 400      |       |
| Collector-Emitter Voltage                                 | $V_{CES}$       | 0          | 600      |       |
| Inverter Collector Current                                | Continuous      | $I_C$      | 15       | A     |
|   | 1ms             | $I_{CP}$   | 30       |       |
|   | Duty=44.1%      | $-I_C$     | 15       |       |
| Collector Power Dissipation <small>One Transistor</small> | $P_C$           |            | 40       | W     |
| Voltage of Power Supply for Driver                        | $V_{CC}$        | -0.3       | 20       | V     |
| Input Signal Current                                      | $I_{IN}$        |            | 1        | mA    |
| Alarm Signal Voltage                                      | $V_{ALM}$       | 0          | $V_{CC}$ | V     |
| Alarm Signal Current                                      | $I_{ALM}$       |            | 15       | mA    |
| Junction Temperature                                      | $T_J$           |            | 150      | °C    |
| Operating Temperature                                     | $T_{OP}$        | -20        | 100      |       |
| Storage Temperature                                       | $T_{stg}$       | -40        | 125      |       |
| Isolation Voltage   | $V_{iso}$       | A.C. 1min. | 2500     | V     |
| Screw Torque  | Mounting (M4)   |            | 2.0      | Nm    |

### ■ Outline Drawing



#### • Electrical Characteristics of Power Circuit ( at $T_j=25^\circ\text{C}$ , $V_{CC}=15\text{V}$ )

| Items                                 | Symbols       | Conditions                                 | Min. | Typ. | Max. | Units |
|---------------------------------------|---------------|--|------|------|------|-------|
| Collector Current At Off Signal Input | $I_{CES}$     | $V_{CE}=600\text{V}$ , Input Terminal Open |      |      | 1.0  | mA    |
| Collector-Emitter Saturation Voltage  | $V_{CE(sat)}$ | $I_C=15\text{A}$                           |      |      | 2.7  | V     |
| Forward Voltage of FWD                | $V_F$         | $-I_C=15\text{A}$                          |      |      | 3.5  | V     |

#### • Electrical Characteristics of Control Circuit ( at $T_j=25^\circ\text{C}$ , $V_{CC}=15\text{V}$ )

| Items                                       | Symbols      | Conditions  | Min. | Typ. | Max. | Units            |
|---|--------------|---|------|------|------|------------------|
| Current of P-Line Side Driver (One Unit)    | $I_{CCP}$    | $f_{SW}=0\sim 15\text{kHz}$ , $T_c=-20\sim 100^\circ\text{C}$ |      | 2.0  | 5.0  | mA               |
| Current of N-Line Side Driver (Three Units) | $I_{CCN}$    | $f_{SW}=0\sim 15\text{kHz}$ , $T_c=-20\sim 100^\circ\text{C}$ |      | 4.0  | 10.0 |                  |
| Input Signal Threshold Voltage              | $V_{IN(th)}$ | On  | 1.00 | 1.35 | 1.70 | V                |
|   |              | Off   | 1.25 | 1.60 | 1.95 |                  |
| Input Zener Voltage                         | $V_Z$        | $R_{IN}=20\text{k}\Omega$                                     |      | 8.0  |      | °C               |
| IGBT Chips Over Heating Protec. Temp. Level | $T_{JOH}$    | Surface Of IGBT Chip  | 150  |      |      |                  |
| Hysteresis                                  | $T_{IH}$     |   |      | 20   |      | A                |
| Inverter Collector Current Protection Level | $I_{OC}$     | N-Side, (N1-N2 open)  | 21   | 27   | 33   |                  |
| Over Current Detecting Time                 | $t_{DOC}$    | $T_j=25^\circ\text{C}$  |      | 5.0  | 7.0  | $\mu\text{s}$    |
| Alarm Signal Hold Time                      | $t_{ALM}$    |   | 1.0  | 2.0  |      | ms               |
| Over Current Detecting Resistance Value     | $R_{OC}$     |   |      | 7.5  |      | $\text{m}\Omega$ |
| Under Voltage Protection Level              | $V_{UV}$     |   | 11.0 |      | 12.5 | V                |
| Hysteresis                                  | $V_H$        |   | 0.2  |      | 0.8  |                  |

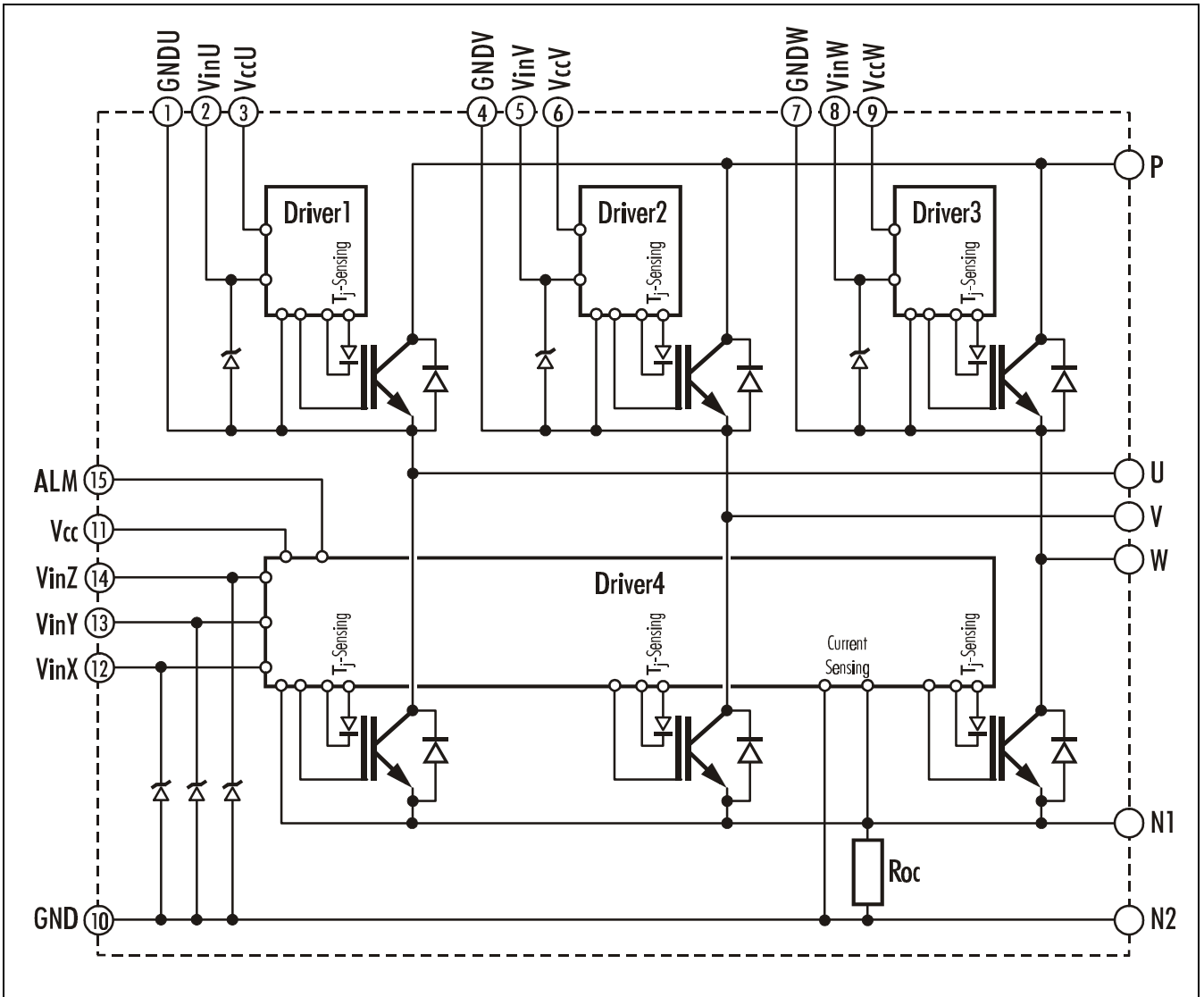
#### • Dynamic Characteristics ( at $T_c=T_j=125^\circ\text{C}$ , $V_{CC}=15\text{V}$ )

| Items          | Symbols   | Conditions                              | Min. | Typ. | Max. | Units         |
|----------------|-----------|---|------|------|------|---------------|
| Switching Time | $t_{ON}$  | $I_C=15\text{A}$ , $V_{DC}=300\text{V}$ | 0.5  |      |      | $\mu\text{s}$ |
|                | $t_{OFF}$ |   |      |      | 3.5  |               |
|                | $t_{RR}$  | $I_F=15\text{A}$ , $V_{DC}=300\text{V}$ |      |      | 0.5  |               |

#### • Thermal Characteristics

| Items              | Symbols       | Conditions            | Min. | Typ. | Max. | Units |
|--------------------|---------------|-----------------------|------|------|------|-------|
| Thermal Resistance | $R_{th(i-c)}$ | Inverter IGBT         |      |      | 3.1  | °C/W  |
|                    | $R_{th(j-c)}$ | Diode                 |      |      | 5.4  |       |
|                    | $R_{th(c-f)}$ | With Thermal Compound |      | 0.05 |      |       |

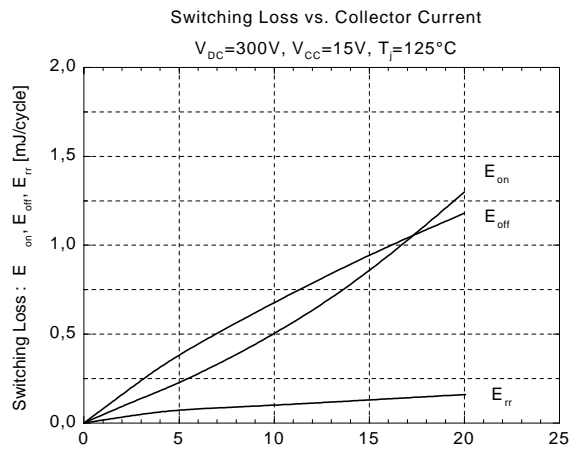
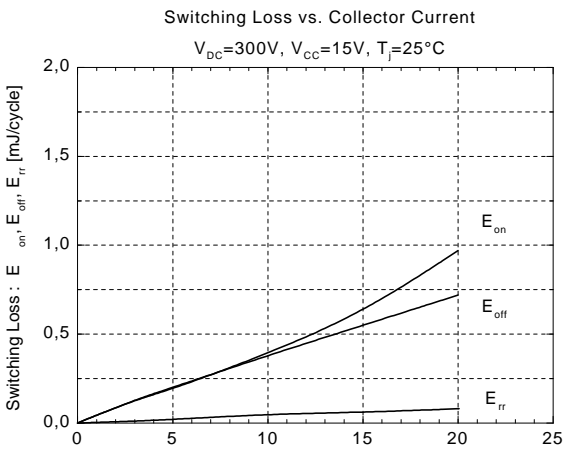
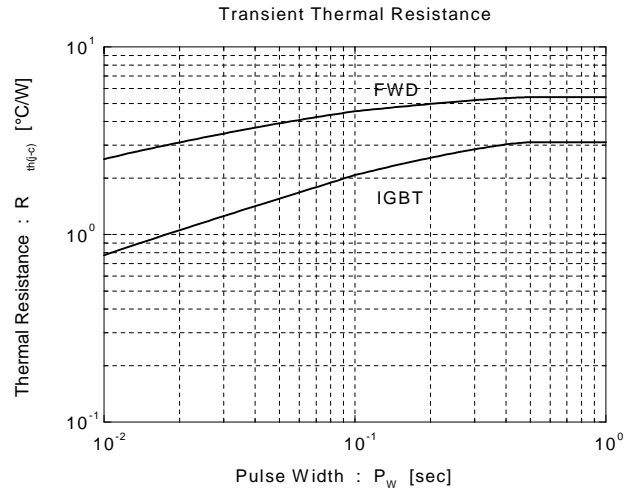
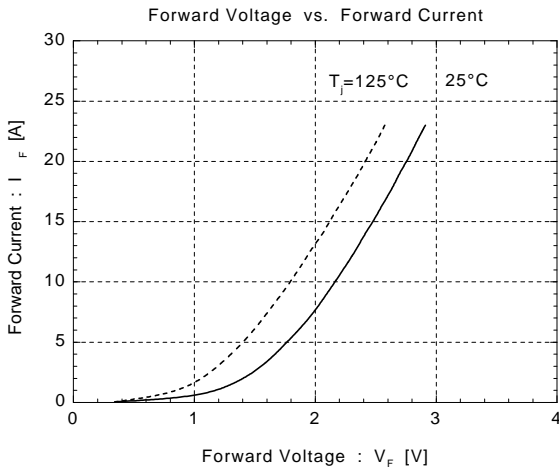
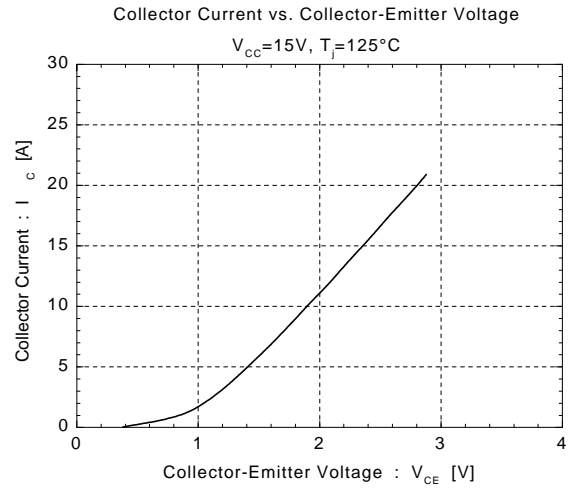
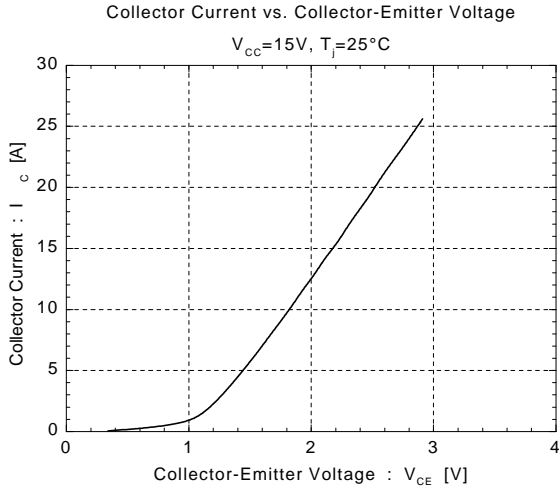
## ■ Equivalent Circuit



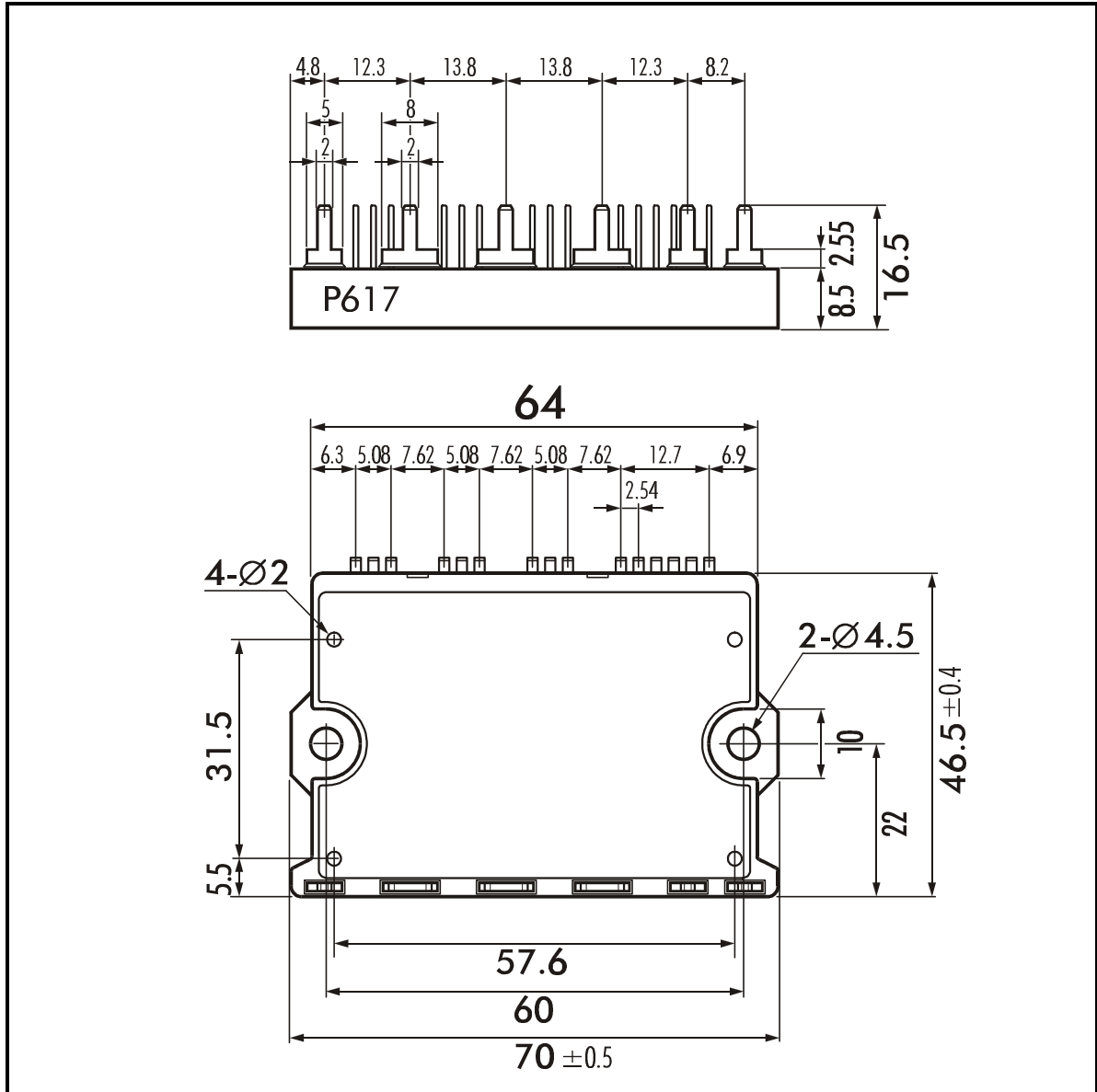
### Drivers include following functions

- Over-current protection circuit
- Amplifier for driver
- Under-voltage protection circuit
- IGBT Chip overheating protection

## ■ Inverter



■ Outline Drawing



**Weight: 50g**