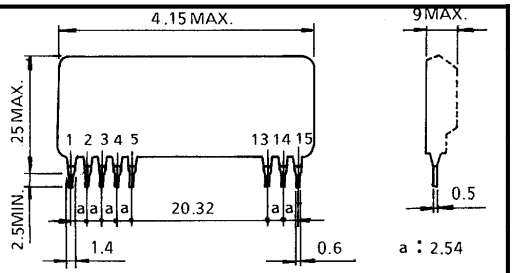
TOSHIBA SOLID STATE IGBT GATE DRIVER MODULE

# TF1205

TOSHIBA TF1205 is the IGBT gate driver designed for use with TOSHIBA Insulated Gate Bipolar Transistor Module and it includes the optical isolator and IGBT gate driver circuit. Using this driver, you can design high reliability and compact system.

- Recommended Conditions :
  Input Supply Voltage : $V_C = 5V$
  Output Supply Voltage : $V_{CC} = 15V$, $V_{EE} = -15V$
- High Speed Switching Response :
  $t_{pLH} = 0.5\mu s$ (Typ.)
  $t_{pHL} = 0.4\mu s$ (Typ.)
- Small Size and Light Weight
- 2500 $V_{AC}$ Optical Isolation
- Including Input-Buffer

Unit in mm




1 : OUTPUT 1
2 : $V_{CC}$
3 : OUTPUT 2
4 : $V_{EE}$
5 : $V_Z$
13 : GND
14 : $V_C$
15 : INPUT

| | |
|---|---|
| JEDEC | — |
| EIAJ | — |
| TOSHIBA | 10-42A1A |

Weight : 8g

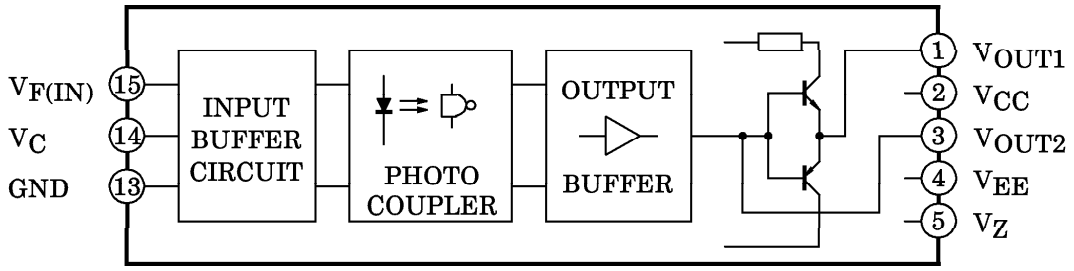
MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC | SYMBOL | RATING | UNIT |
|---|---|---|---|
| Input Supply Voltage | $V_C$ | 6 | V |
| Input Voltage | $V_{F(IN)}$ | $-0.5 \sim V_C + 0.5$ | |
| Output Supply Voltage | $V_{CC}$ | 18 | V |
| | $V_{EE}$ | −18 | |
| Output Voltage | $V_{OUT}$ | $V_{CC} \sim V_{EE}$ | V |
| High Level Peak Output Current (Note 1) | $I_{OHP}$ | 2 (10$\mu$s) | A |
| Low Level Peak Output Current (Note 1) | $I_{OLP}$ | −3 (10$\mu$s) | A |
| Operating Frequency (Note 2) | f | 30 | kHz |
| Isolation (Input-Output) | BVS / AC | 2500 (1min) | V |
| Operating Temperature | $T_{opr}$ | −20~70 | °C |
| Storage Temperature | $T_{stg}$ | −20~85 | °C |
| Lead Soldering Temperature | $T_{sol}$ | 260°C (10s) | °C |

Note 1 : Exponential Waveform (f = 15kHz, Fig.1)
Note 2 : $I_{OHP} = 2A$ (5$\mu$s), $I_{OLP} = -3A$ (5$\mu$s), Exponential Waveform (Fig.1)

961001EBA2

BLOCK DIAGRAM




ELECTRICAL CHARACTERISTICS (Ta = 25°C, $V_C$ = 5V, $V_{CC}$ = 15V, $V_{EE}$ = −15V, $R_Z$ = 500Ω, f = 10kHz)

| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| High Level Input Voltage | $V_{FT}$ | $V_{OUT1}$ > 0V (Fig.2, 3) | 0.5 | 1.5 | — | V |
| High Level Input Current | $I_{FT}$ | $V_{OUT1}$ > 0V (Fig.2, 3) | −1.0 | −0.5 | — | mA |
| Input Impedance | $Z_{(IN)}$ | $V_{F(IN)}$ = 0 | — | 10 | — | kΩ |
| High Level Output Voltage | $V_{OH}$ | $V_{F(IN)}$ = 5→0V, $R_L$ = 200Ω (Fig.2, 3) | 13 | 13.5 | — | V |
| Low Level Output Voltage | $V_{OL}$ | $V_{F(IN)}$ = 0→5V, $R_L$ = 200Ω (Fig.2, 3) | — | −13.5 | −13 | |
| High Level Supply Current | $I_{CCH}$ | $V_{F(IN)}$ = 5→0V, $V_{OUT1}$ > 0V (Fig.2, 3) | — | 25 | — | mA |
| Low Level Supply Current | $I_{CCL}$ | $V_{F(IN)}$ = 0→5V, $V_{OUT1}$ < 0V (Fig.2, 3) | — | 20 | — | |
| Zener Voltage (Coupler Supply) | $V_Z$ | $I_Z$ = 20mA, 4pin to 5pin | — | 5.1 | — | V |
| Propagation Delay Time to High Output Level | $t_{pLH}$ | $V_{F(IN)}$ = 5→0V, $V_{OUT1}$ > 0V, $R_L$ = 200Ω (Fig.2, 3) | — | 0.5 | 1.0 | μs |
| Output Rise Time | $t_r$ | | — | 0.25 | — | |
| Propagation Delay Time to Low Output Level | $t_{pHL}$ | $V_{F(IN)}$ = 0→5V, $V_{OUT1}$ < 0V, $R_L$ = 200Ω (Fig.2, 3) | — | 0.4 | 0.8 | μs |
| Output Fall Time | $t_f$ | | — | 0.10 | — | |
| Common Mode Transient Immunity at Logic High Output | $CM_H$ | $V_{CM}$ = 400V | 1 | 10 | — | kV / μs |
| Isolation Resistance (Input-Output) | $R_S$ | V = 1kV, RH = 40~60% | — | $10^{10}$ | — | Ω |

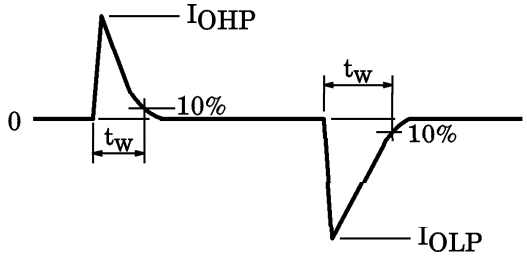



Fig.1 EXPONENTIAL WAVEFORM

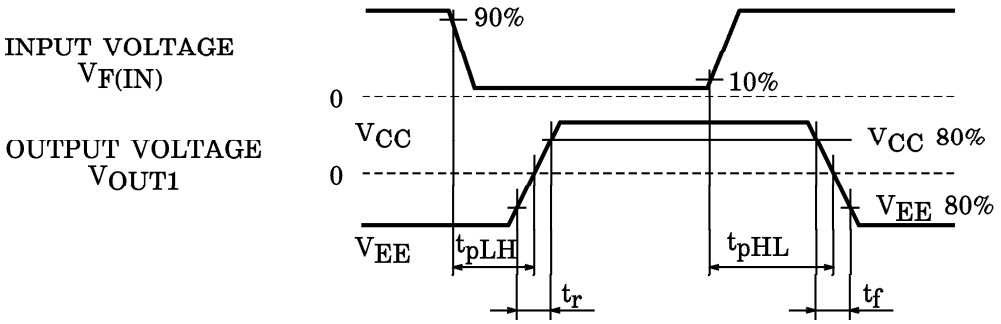



Fig.2 SWITCHING TIME TEST CONDITION

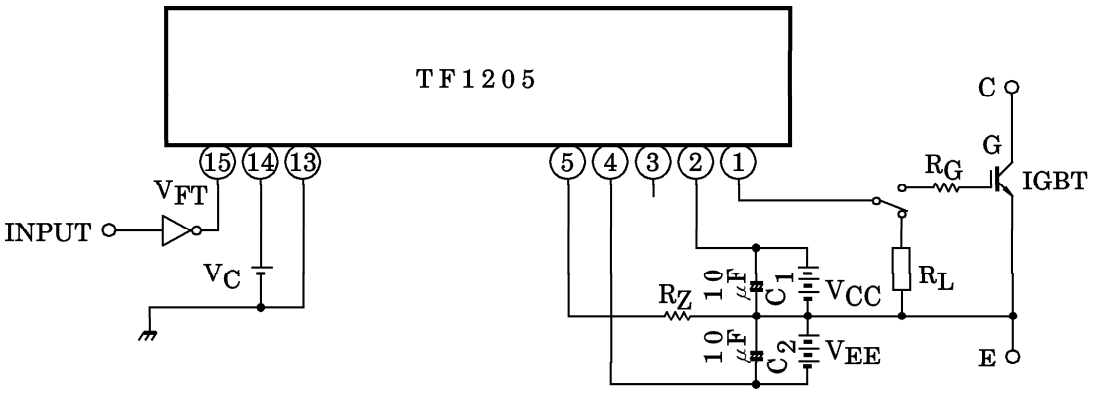
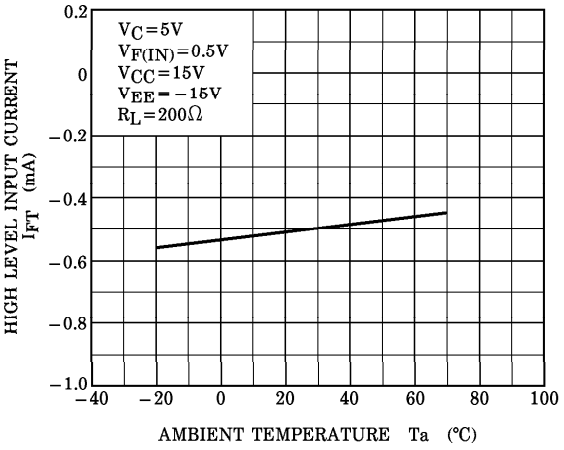
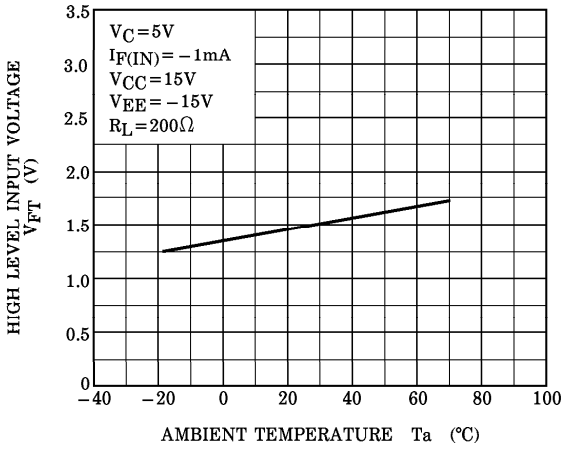



Fig.3 SWITCHING TIME TEST CIRCUIT

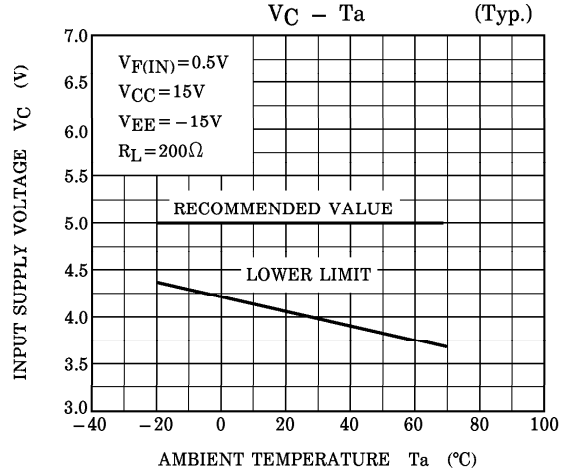
$I_{FT}$ – Ta (Typ.)



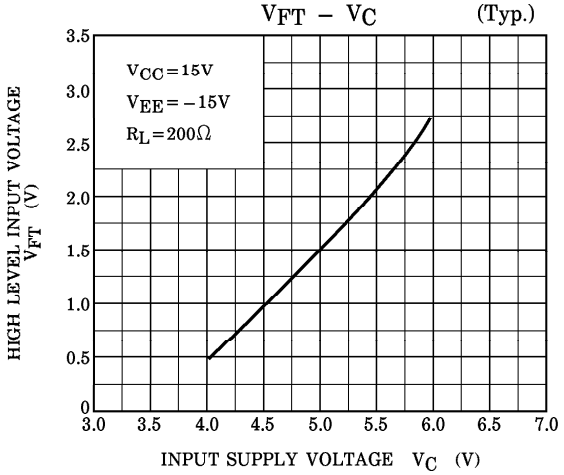

$V_{FT}$ – Ta (Typ.)



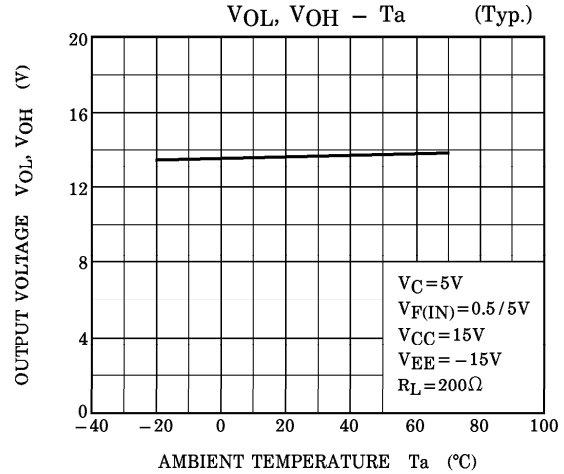

$V_C$ – Ta (Typ.)



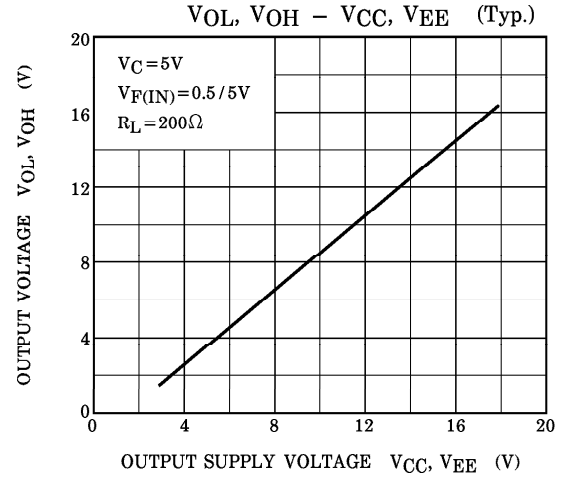

$V_{FT}$ – $V_C$ (Typ.)



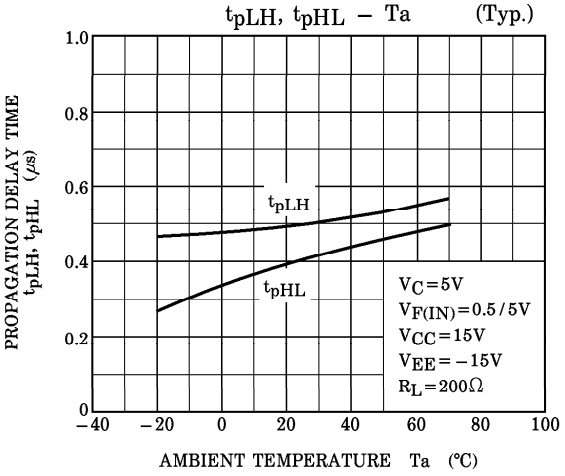

$V_{OL}$, $V_{OH}$ – Ta (Typ.)



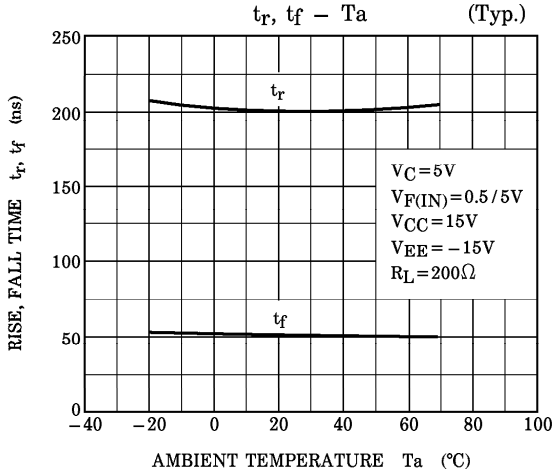

$V_{OL}$, $V_{OH}$ – $V_{CC}$, $V_{EE}$ (Typ.)



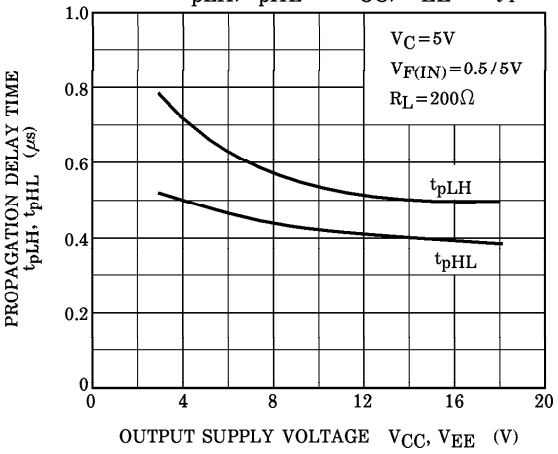
$t_{pLH}$, $t_{pHL}$ – Ta (Typ.)




$t_r$, $t_f$ – Ta (Typ.)




$t_{pLH}$, $t_{pHL}$ – $V_{CC}$, $V_{EE}$ (Typ.)




$t_{pLH}$, $t_{pHL}$ – $V_C$ (Typ.)