# M63850P/FP

4-UNIT 1.5A DMOS ARRAY WITH CLAMP DIODE



## DESCRIPTION

The M63850P/FP is a inverter input power DMOS transistor array that consists of 4 independent output N-channel DMOS transistors.

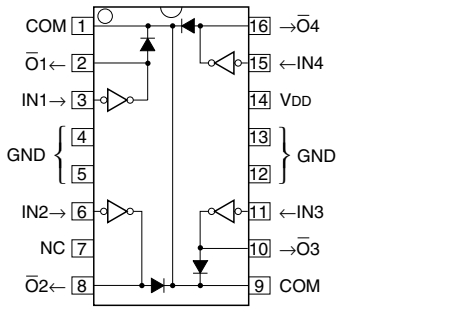
## FEATURES

- 4 circuits of N-channels DMOS
- High breakdown voltage ($V_{DS}$ ≥ 80V)
- High-current driving ($I_{DS}$(max) = 1.5A)
- With clamping diodes
- Drain-source on-state low resistance ($R_{ON}$ = 0.72Ω, @ = 1.25A)
- Wide operating temperature range (Ta = –40 to +85°C)

## APPLICATION

Drives of relays and printers, digit drives of indication elements (LEDs and lamps)

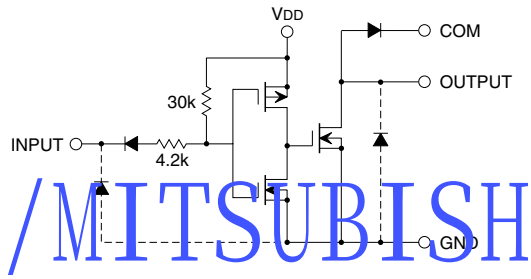
## PIN CONFIGURATION




NC : No connection

Package type 16P4(P)
16P2N(FP)

## CIRCUIT DIAGRAM




The four circuits share the COM and GND.

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

Unit : Ω



## FUNCTION

The M63850P/FP is consists of 4 independent N-channel DMOS transistors. Each DMOS transistor is connected in a common-source with GND PIN. The clamp diodes for spike killers are connected between the output pin and the COM pin of each DMOS transistor. The maximum of Drain current is 1.5A. The maximum Drain-Source voltage is 80V.

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

| Symbol | Parameter | Conditions | Ratings | Unit |
|---|---|---|---|---|
| $V_{DD}$ | Supply voltage | | 7 | V |
| $V_{DS}$ | Drain-source voltage | Output, H | –0.5 ~ +80 | V |
| $I_{DS}$ | Drain current | Current per circuit output, L | 1.5 | A |
| $V_I$ | Input voltage | | –0.5 ~ $V_{DD}$ | V |
| $V_R$ | Clamping diode reverse voltage | | 80 | V |
| $I_F$ | Clamping diode forward current | | 1.5 | A |
| Pd | Power dissipation | Ta = 25°C, when mounted on board | 1.47(P)/1.00(FP) | W |
| Topr | Operating temperature | | –40 ~ +85 | °C |
| Tstg | Storage temperature | | –55 ~ +125 | °C |



MITSUBISHI ELECTRIC

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

# M63850P/FP

4-UNIT 1.5A DMOS ARRAY WITH CLAMP DIODE

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

| Symbol | Parameter | Conditions | Limits | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| $V_{DD}$ | Supply voltage | | 4.5 | 5.0 | 5.5 | V |
| $V_{DS}$ | Drain-source voltage | | 0 | — | 80 | V |
| $I_{DS}$ | Drain current (Current per 1 circuit when 4 circuits are coming on simultaneously) | $V_{DD}$ = 5V, Duty Cycle<br>P : no more than 4%<br>FP : no more than 2% | 0 | — | 1.25 | A |
| | | $V_{DD}$ = 5V, Duty Cycle<br>P : no more than 36%<br>FP : no more than 15% | 0 | — | 0.7 | |
| $V_{IH}$ | "H" input voltage | | $V_{CC}$-1.0 | — | $V_{CC}$ | V |
| $V_{IL}$ | "L" input voltage | | 0 | — | $V_{CC}$-3.0 | V |

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

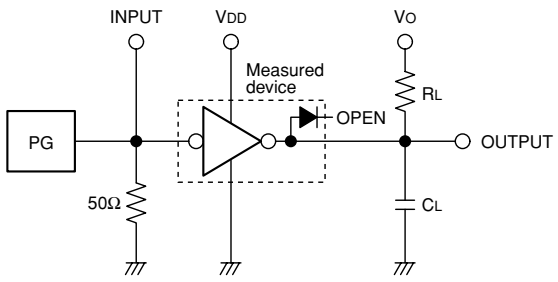
| Symbol | Parameter | Test conditions | Limits | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| $I_{DD(ON)}$ | On supply current | $V_{DD}$ = 5.5V, $V_I$ = 0V, 1 circuit only | — | 130 | 300 | μA |
| $I_{DD(OFF)}$ | Off supply current | $V_{DD}$ = 5.5V, $V_I$ = 5.5V | — | — | 10 | μA |
| $I_{O(LEAK)}$ | Output leak current | $V_{DD}$ = 5.5V, $V_I$ = 5.5V, $V_{DS}$ = 80V | — | — | 10 | μA |
| $V_{ON}$ | Output on voltage | $V_I$ = 4.5V, $I_{DS}$ = 0.7A | — | 0.45 | 0.72 | V |
| | | $V_I$ = 4.5V, $I_{DS}$ = 1.25A | — | 0.9 | 1.44 | |
| $R_{ON}$ | Output on resistance | $V_I$ = 4.5V, $I_{DS}$ = 1.25A | — | 0.72 | 1.15 | Ω |
| $I_{IH}$ | "H" input current | $V_{DD}$ = 5.5V, $V_I$ = 5.5V | — | — | 10 | μA |
| $I_{IL}$ | "L" input current | $V_{DD}$ = 5.5V, $V_I$ = 0V | — | –130 | –300 | μA |
| $I_R$ | Clamping diode reverse current | $V_R$ = 80V | — | — | 10 | μA |
| $V_F$ | Clamping diode forward voltage | $I_F$ = 1.25A | — | 1.3 | 2.0 | V |



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

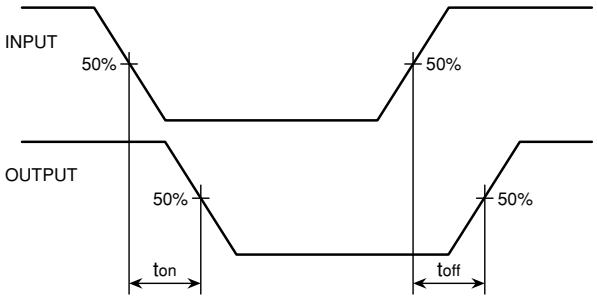
| Symbol | Parameter | Test conditions | Limits | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| $t_{on}$ | Turn-on time | $C_L$ = 15pF (Note 1) | — | 45 | — | ns |
| $t_{off}$ | Turn-off time | | — | 125 | — | ns |

**Note 1 : TEST CIRCUIT**




(1)Pulse generator (PG) characteristics : PRR = 1kHz, tw = 10μs, tr = 6ns, tf = 6ns, Zo = 50Ω, $V_{IH}$ = 5V
(2)Input-output conditions : $R_L$ = 8.3Ω, Vo = 10V, $V_{DD}$ = 4.5V
(3)Electrostatic capacity $C_L$ includes floating capacitance at connections and input capacitance at probes.

**TIMING DIAGRAM**

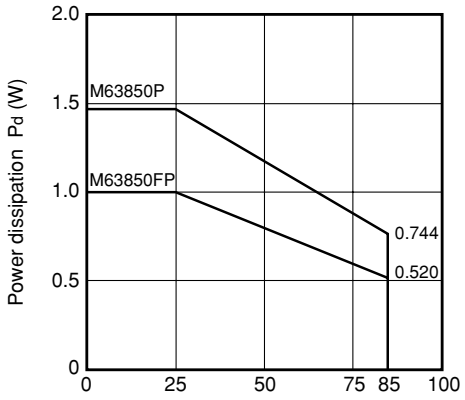




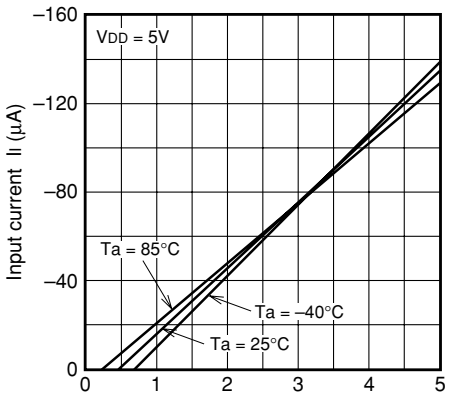

MITSUBISHI ELECTRIC

## TYPICAL CHARACTERISTICS

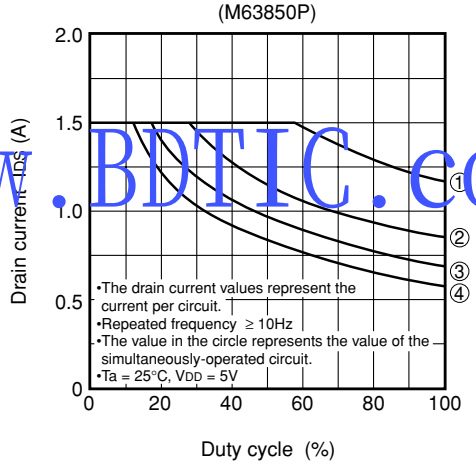
Thermal Derating Factor Characteristics



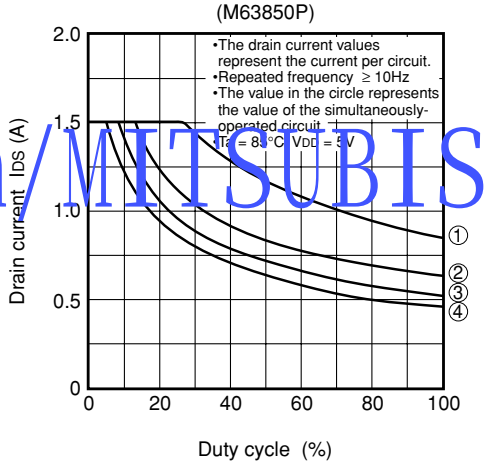

Input Characteristics



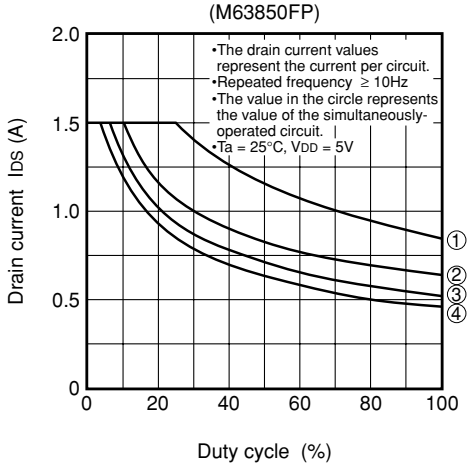

Duty Cycle - Drain Current Characteristics (M63850P)



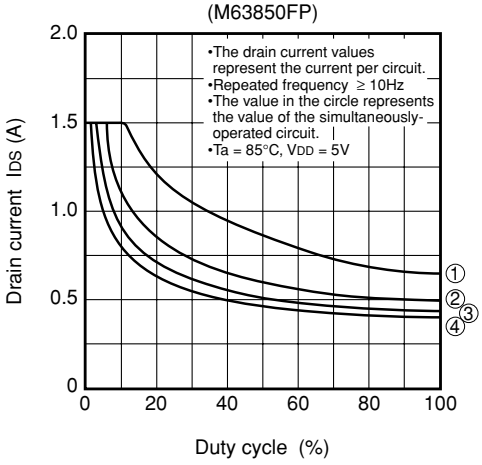

Duty Cycle - Drain Current Characteristics (M63850P)



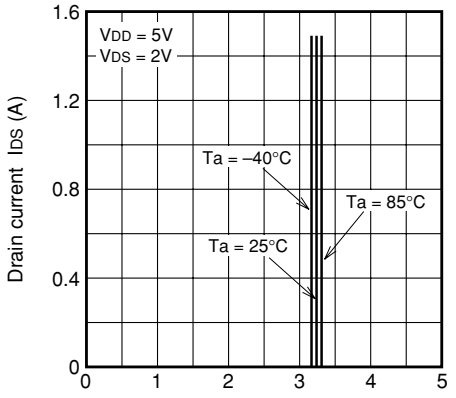

Duty Cycle - Drain Current Characteristics (M63850FP)



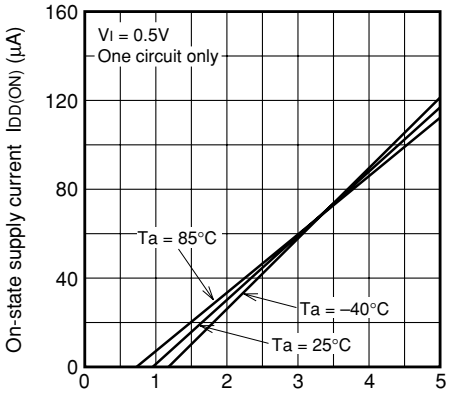

Duty Cycle - Drain Current Characteristics (M63850FP)



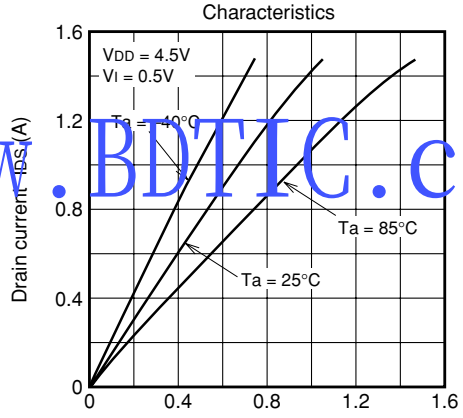
Input Voltage - Drain Current Characteristics



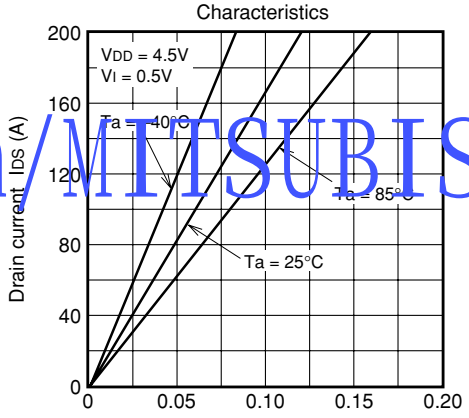

Supply Voltage - On Supply Current Characteristics




Output On Voltage - Drain Current Characteristics

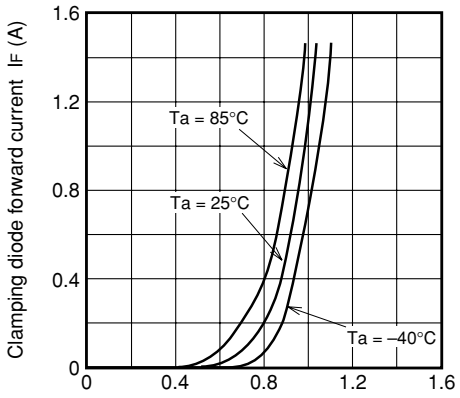



Output On Voltage - Drain Current Characteristics

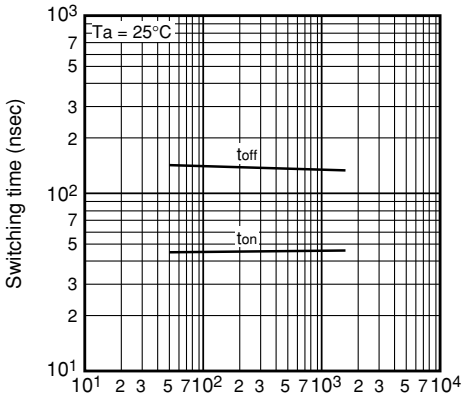




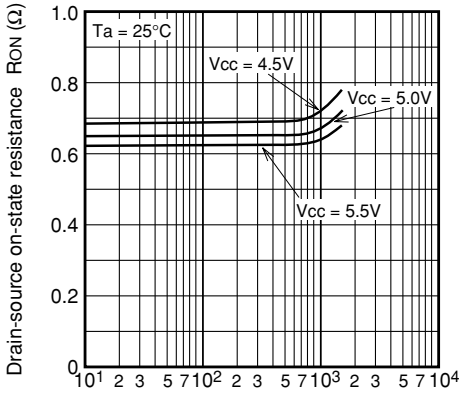

Clamping Diode Characteristics




Switching Characteristics



Drain Current - Output On Resistance Characteristics




Output On Resistance - Ambient Temperature Characteristics