# MOSFET – Power, Single MCPH6, P-Channel

## -12 V, -9 A, 16.9 mΩ

# MCH6351

| $V_{DSS}$ | $R_{DS(ON)}$ MAX | $I_D$ MAX |
|---|---|---|
| −12 V | 16.9 mΩ @ −4.5 V | −9 A |
| | 24 mΩ @ −2.5 V | |
| | 40 mΩ @ −1.8 V | |
| | 74 mΩ @ −1.5 V | |

### Features

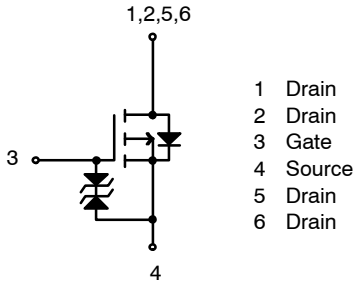
- ON−Resistance $R_{DS(on)}1$ = 14 mΩ (typ)
- 1.5 V Drive
- Protection Diode in
- This Device is Pb−Free and Halogen Free and RoHS Compliant

### ABSOLUTE MAXIMUM RATINGS (Ta = 25°C) (Note 1)

| Parameter | Symbol | Conditions | Value | Unit |
|---|---|---|---|---|
| Drain−to−Source Voltage | $V_{DSS}$ | | −12 | V |
| Gate−to−Source Voltage | $V_{GSS}$ | | ±10 | V |
| Drain Current (DC) | $I_D$ | | −9 | A |
| Drain Current (Pulse) | $I_{DP}$ | PW ≤ 10 μs, duty cycle ≤ 1% | −36 | A |
| Allowable Power Dissipation | $P_D$ | When mounted on ceramic substrate (1500 $mm^2$ x 0.8 mm) | 1.5 | W |
| Channel Temperature | Tch | | 150 | °C |
| Storage Temperature | Tstg | | −55 to +150 | °C |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. $V_{DD}$ = −10 V, L = 500 μH, $I_{AV}$ = −18 A

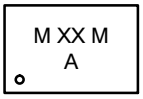



**ELECTRICAL CONNECTION P−CHANNEL**



**SC−88FL / MCPH6**
**CASE 419AS**

### MARKING DIAGRAM




XX = Specific Device Code, NA
M = Date Code
Left Side = Jan tu Jun
Right Side = Jul to Dec
A = Location Code

### ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| MCH6351−TL−W | MCPH6 SC−88, SOT−363 (Pb−Free, Halogen Free) | 3000 / Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

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**ELECTRICAL CHARACTERISTICS** ($T_J$ = 25°C unless otherwise specified)

| Parameter | Symbol | Test Condition | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| Drain to Source Breakdown Voltage | $V_{(BR)DSS}$ | $I_D$ = −1 mA, $V_{GS}$ = 0 V | −12 | – | – | V |
| Zero−Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = −12 V, $V_{GS}$ = 0 V | – | – | −1 | μA |
| Gate to Source Leakage Current | $I_{GSS}$ | $V_{GS}$ = ±8 V, $V_{DS}$ = 0 V | – | – | ±10 | μA |
| Cutoff Voltage | $V_{GS}$(off) | $V_{DS}$ = −6 V, $I_D$ = −1 mA | −0.4 | – | −1.3 | V |
| Forward Transfer Admittance | \| yfs \| | $V_{DS}$ = −6 V, $I_D$ = −4.5 A | – | 16.5 | – | S |
| Static Drain to Source On−State Resistance | $R_{DS}$(on)1 | $I_D$ = −4.5 A, $V_{GS}$ = −4.5 V | – | 14 | 16.9 | mΩ |
| | $R_{DS}$(on)2 | $I_D$ = −2.0 A, $V_{GS}$ = −2.5 V | – | 19 | 24 | mΩ |
| | $R_{DS}$(on)3 | $I_D$ = −1.0 A, $V_{GS}$ = −1.8 V | – | 28 | 40 | mΩ |
| | $R_{DS}$(on)4 | $I_D$ = −1.0 A, $V_{GS}$ = −1.5 V | – | 37 | 74 | mΩ |
| Input Capacitance | Ciss | $V_{DS}$ = −6 V, f = 1 MHz | – | 2200 | – | pF |
| Output Capacitance | Coss | | – | 350 | – | pF |
| Reverse Transfer Capacitance | Crss | | – | 320 | – | pF |
| Turn−ON Delay Time | $t_d$(on) | See specified Test Circuit | – | 12.3 | – | ns |
| Rise Time | $t_r$ | | – | 89 | – | ns |
| Turn−OFF Delay Time | $t_d$(off) | | – | 260 | – | ns |
| Fall Time | $t_f$ | | – | 122 | – | ns |
| Total Gate Charge | Qg | $V_{DS}$ = −6 V, $V_{GS}$ = −4.5 V, $I_D$ = −9 A | – | 20.5 | – | nC |
| Gate to Source Charge | Qgs | | – | 4.2 | – | nC |
| Gate to Drain “Miller” Charge | Qgd | | – | 3.2 | – | nC |
| Diode Forward Voltage | $V_{SD}$ | $I_S$ = −9 A, $V_{GS}$ = 0 V | – | −0.83 | −1.2 | V |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

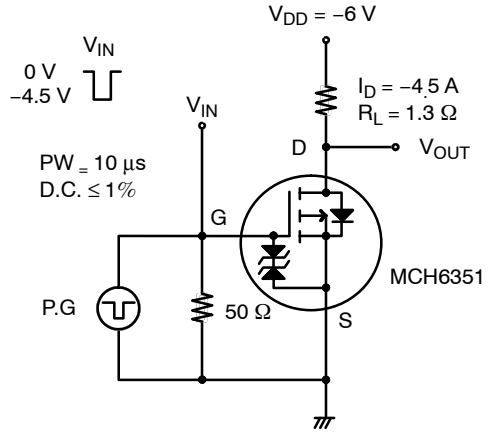



**Figure 1. Switching Time Test Circuit**

## TYPICAL CHARACTERISTICS

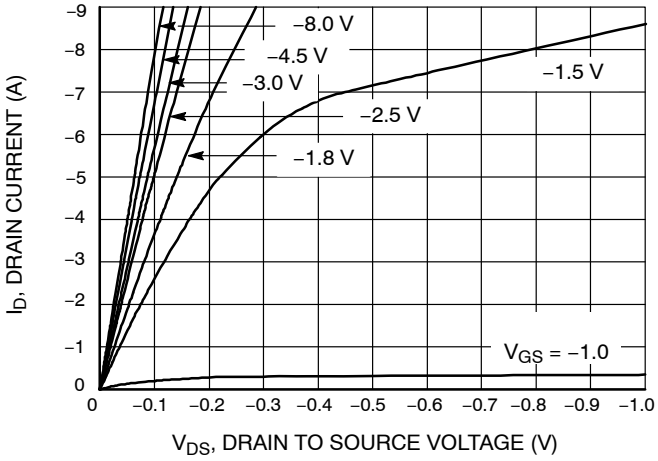



**Figure 2. $I_D$ – $V_{DS}$**

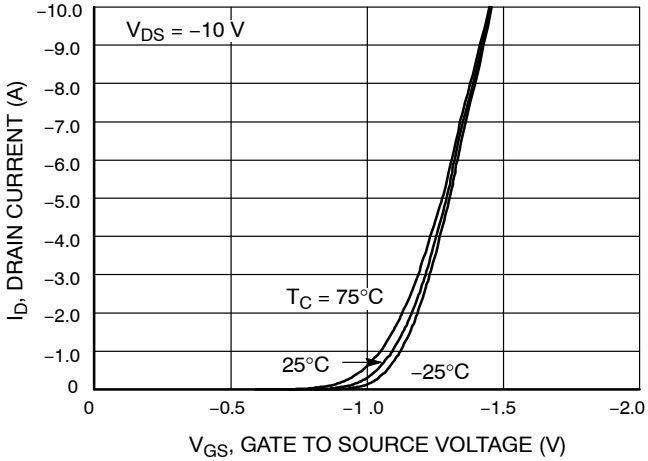



**Figure 3. $I_D$ – $V_{GS}$**

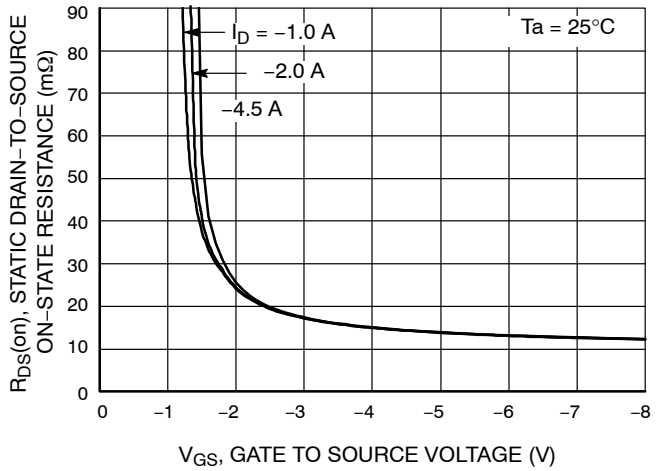



**Figure 4. $R_{DS}(on)$ – $V_{GS}$**

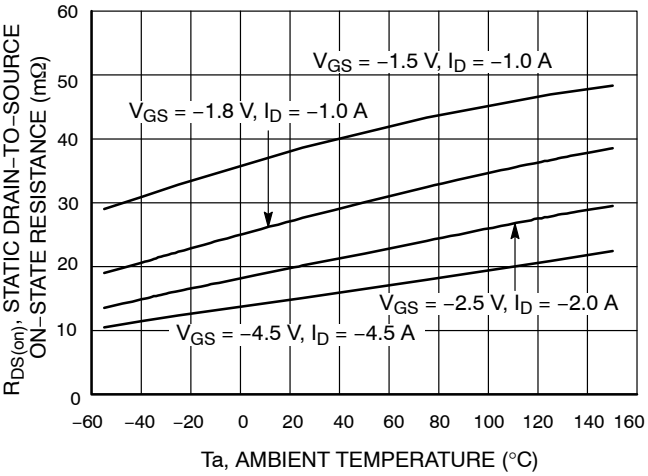



**Figure 5. $R_{DS}(on)$ – Ta**

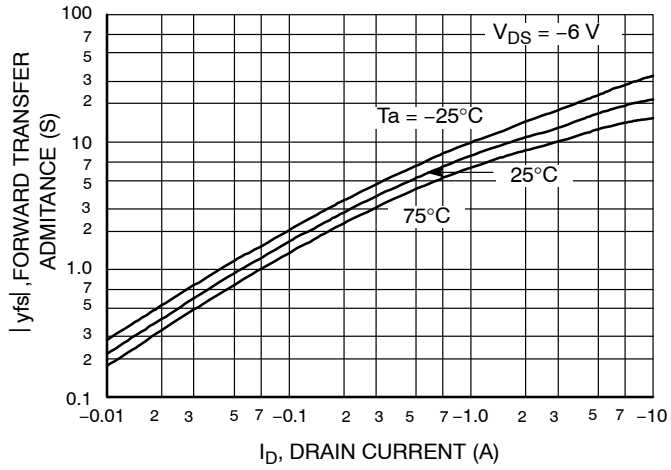



**Figure 6. $|yfs|$ – $I_D$**

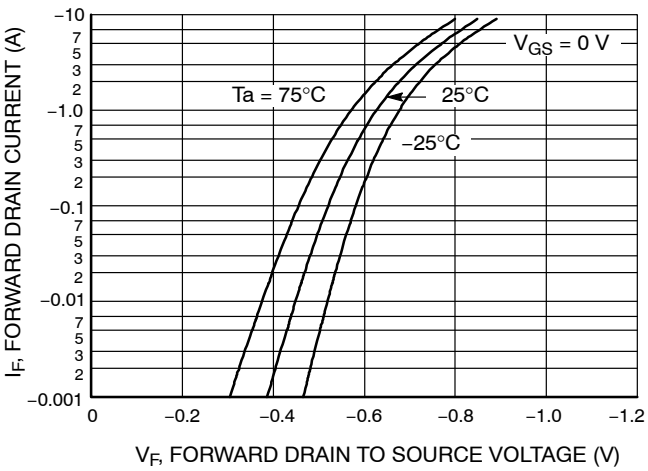



**Figure 7. $I_F$ – $V_{SD}$**

## TYPICAL CHARACTERISTICS (CONTINUED)

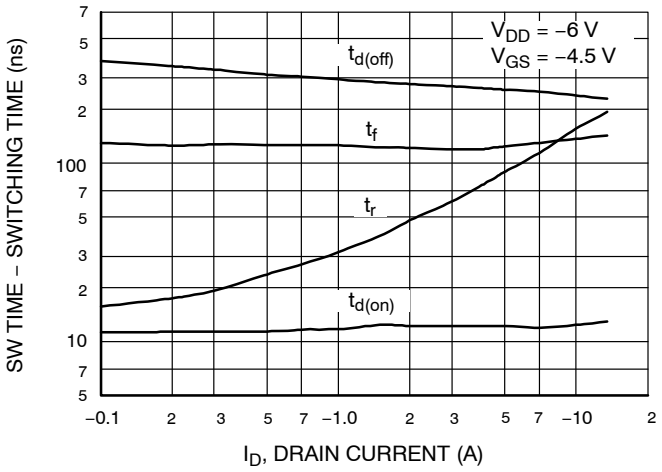



**Figure 8. SW Time – $I_D$**

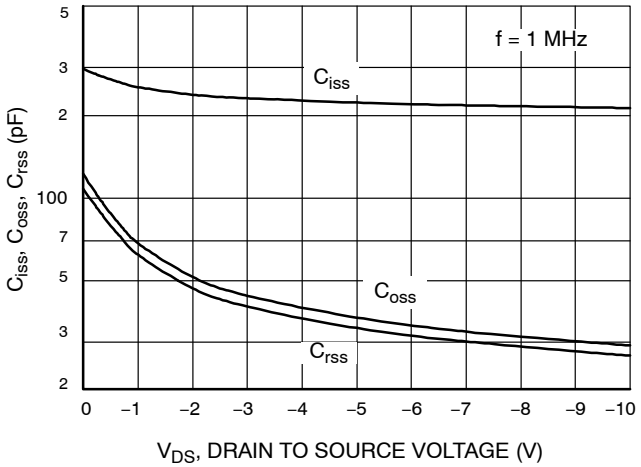



**Figure 9. $C_{iss}$, $C_{oss}$, $C_{rss}$ – $V_{DS}$**

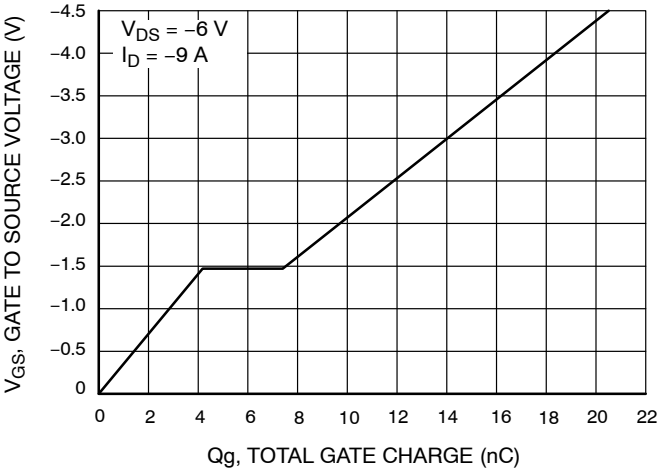



**Figure 10. $Q_g$ – $V_{GS}$**

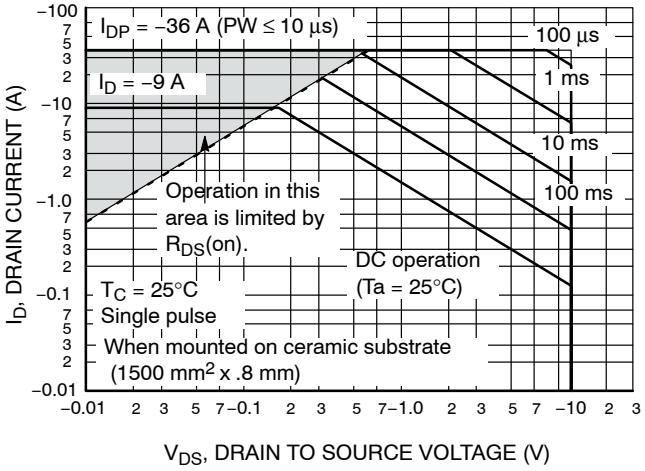



**Figure 11. ASO**

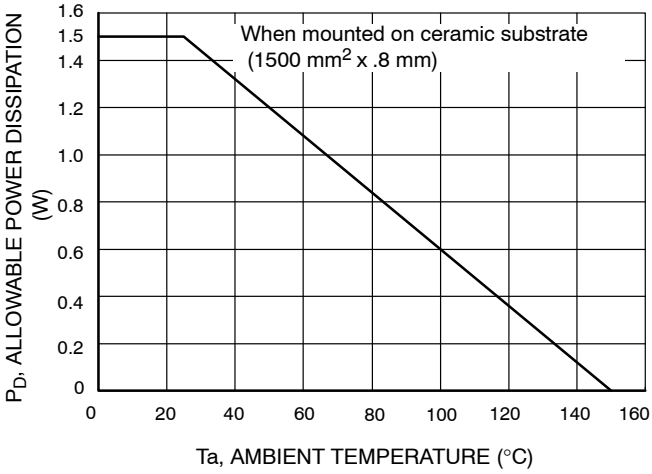
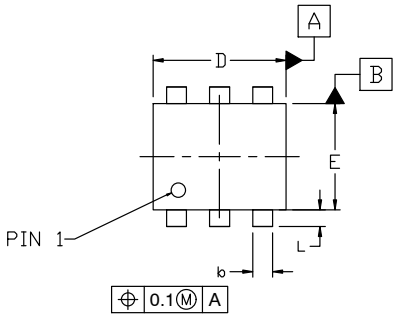



**Figure 12. $P_D$ – Ta**

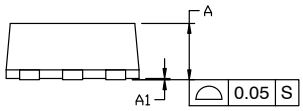


**SC−88FL / MCPH6**
CASE 419AS
ISSUE A

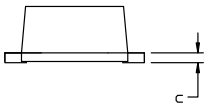
DATE 28 SEP 2022



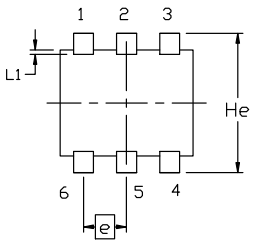

TOP VIEW




SIDE VIEW




FRONT VIEW



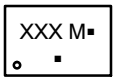

BOTTOM VIEW

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3. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND THE BAR PROTRUSIONS.

| DIM | MILLIMETERS | | |
|---|---|---|---|
| | MIN. | NOM. | MAX. |
| A | 0.80 | 0.85 | 0.90 |
| A1 | 0.00 | --- | 0.02 |
| b | 0.25 | 0.30 | 0.40 |
| c | 0.12 | 0.15 | 0.25 |
| D | 1.94 | 2.00 | 2.06 |
| E | 1.54 | 1.60 | 1.66 |
| He | 2.05 | 2.10 | 2.15 |
| L | 0.19 | 0.25 | 0.31 |
| L1 | 0.00 | 0.07 | 0.12 |
| e | 0.65 BSC | | |

**GENERIC**
**MARKING DIAGRAM***




XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

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