# MCH6336

## Power MOSFET
## –12V, 43mΩ, –5A, Single P-Channel

ON Semiconductor®

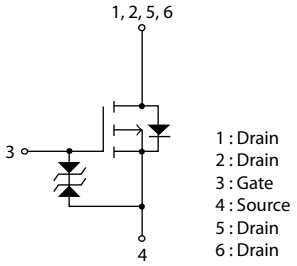
www.onsemi.com

| $V_{DSS}$ | $R_{DS}$(on) Max | $I_D$ Max |
|---|---|---|
| –12V | 43mΩ@ –4.5V | –5A |
| | 66mΩ@ –2.5V | |
| | 98mΩ@ –1.8V | |

### Features

- Low On-Resistance
- 1.8V Drive
- High Speed Switching
- ESD Diode-Protected Gate
- Pb-Free and RoHS Compliance
- Halogen Free Compliance : MCH6336-TL-H, MCH6336-TL-W

### Electrical Connection
**P-Channel**




### Specifications

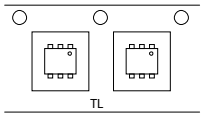
**Absolute Maximum Ratings** at Ta = 25°C

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain to Source Voltage | $V_{DSS}$ | –12 | V |
| Gate to Source Voltage | $V_{GSS}$ | ±10 | V |
| Drain Current (DC) | $I_D$ | –5 | A |
| Drain Current (Pulse)<br>PW≤10μs, duty cycle≤1% | $I_{DP}$ | –20 | A |
| Power Dissipation<br>When mounted on ceramic substrate<br>(1200mm$^2$ × 0.8mm) | $P_D$ | 1.5 | W |
| Junction Temperature | Tj | 150 | °C |
| Storage Temperature | Tstg | –55 to +150 | °C |

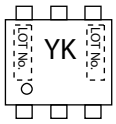
**Thermal Resistance Ratings**

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Junction to Ambient<br>When mounted on ceramic substrate<br>(1200mm$^2$ × 0.8mm) | $R_{\theta JA}$ | 83.3 | °C/W |

### Packing Type : TL




### Marking




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.

**ORDERING INFORMATION**

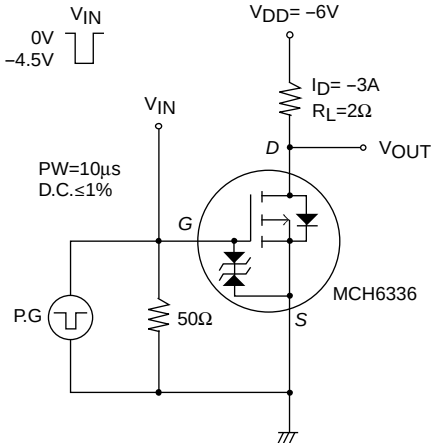
See detailed ordering and shipping information on page 5 of this data sheet.

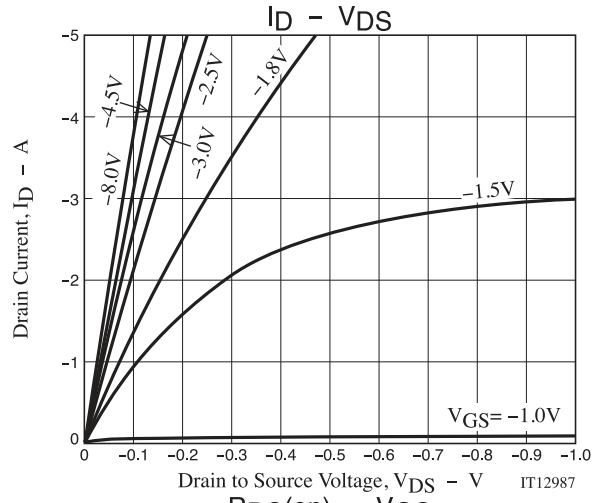
## Electrical Characteristics at Ta = 25°C

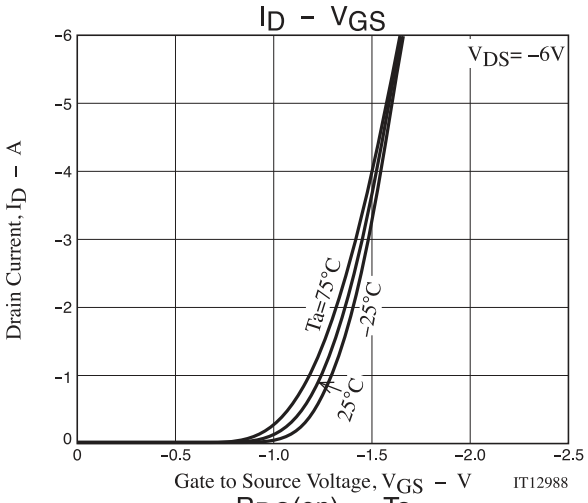
| Parameter | Symbol | Conditions | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| Drain to Source Breakdown Voltage | $V_{(BR)DSS}$ | $I_D$=–1mA, $V_{GS}$=0V | –12 | | | V |
| Zero-Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=–12V, $V_{GS}$=0V | | | –10 | μA |
| Gate to Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±8V, $V_{DS}$=0V | | | ±10 | μA |
| Gate Threshold Voltage | $V_{GS}(th)$ | $V_{DS}$=–6V, $I_D$=–1mA | –0.4 | | –1.4 | V |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=–6V, $I_D$=–3A | 4.8 | 8.1 | | S |
| Static Drain to Source On-State Resistance | $R_{DS}(on)1$ | $I_D$=–3A, $V_{GS}$=–4.5V | | 33 | 43 | mΩ |
| | $R_{DS}(on)2$ | $I_D$=–1.5A, $V_{GS}$=–2.5V | | 47 | 66 | mΩ |
| | $R_{DS}(on)3$ | $I_D$=–0.5A, $V_{GS}$=–1.8V | | 68 | 98 | mΩ |
| Input Capacitance | Ciss | $V_{DS}$=–6V, f=1MHz | | 660 | | pF |
| Output Capacitance | Coss | | | 210 | | pF |
| Reverse Transfer Capacitance | Crss | | | 155 | | pF |
| Turn-ON Delay Time | $t_d(on)$ | See specified Test Circuit | | 7.4 | | ns |
| Rise Time | $t_r$ | | | 57 | | ns |
| Turn-OFF Delay Time | $t_d(off)$ | | | 72 | | ns |
| Fall Time | $t_f$ | | | 69 | | ns |
| Total Gate Charge | Qg | $V_{DS}$=–6V, $V_{GS}$=–4.5V, $I_D$=–5A | | 6.9 | | nC |
| Gate to Source Charge | Qgs | | | 1.2 | | nC |
| Gate to Drain “Miller” Charge | Qgd | | | 1.8 | | nC |
| Forward Diode Voltage | $V_{SD}$ | $I_S$=–5A, $V_{GS}$=0V | | –0.83 | –1.2 | V |

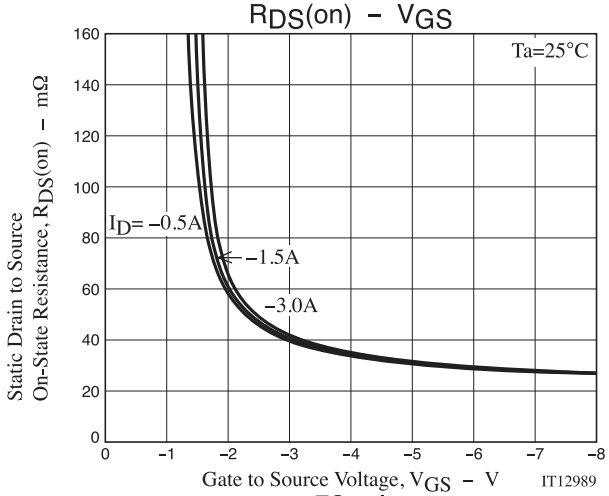
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

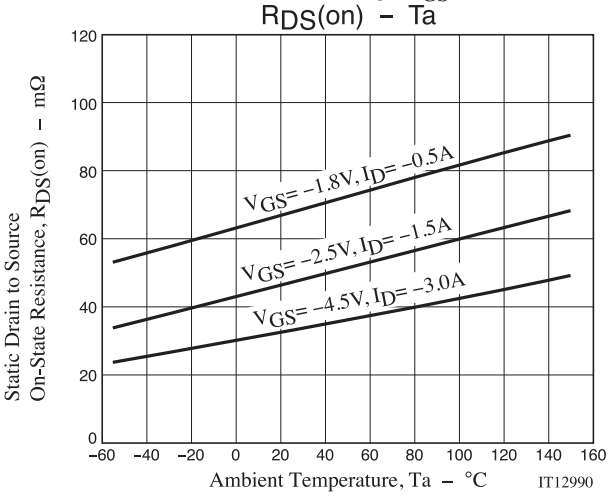
## Switching Time Test Circuit

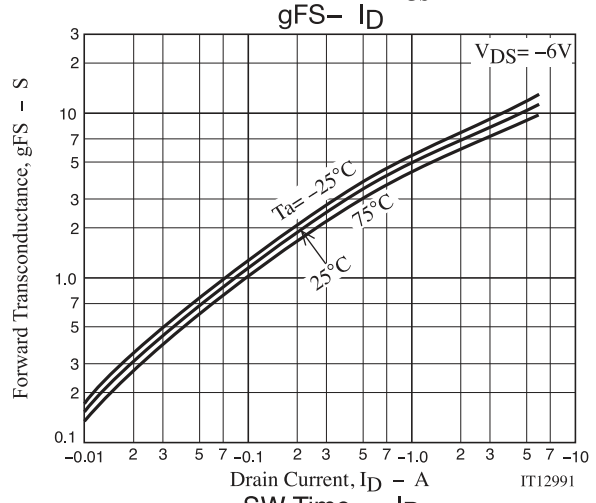


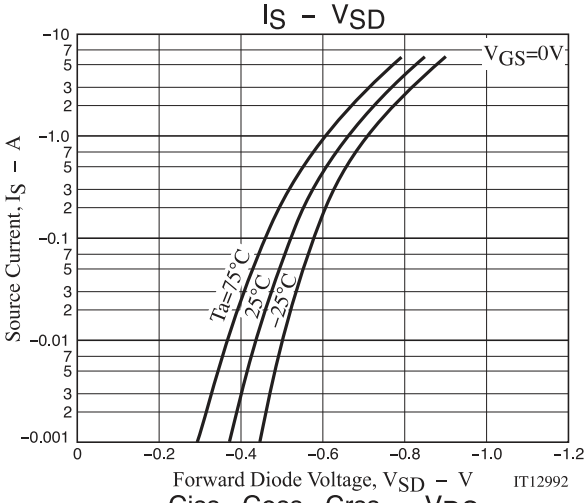

ID – VDS
Drain Current, ID – A
Drain to Source Voltage, VDS – V
IT12987
–4.5V
–2.5V
–1.8V
–8.0V
–3.0V
–1.5V
VGS= –1.0V

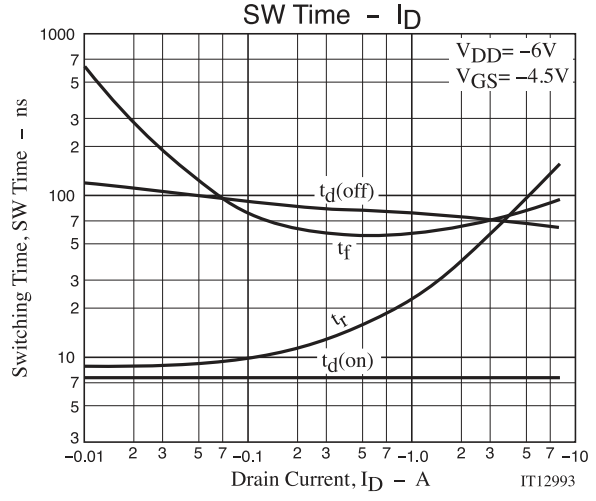

ID – VGS
Drain Current, ID – A
Gate to Source Voltage, VGS – V
IT12988
VDS= –6V
Ta=75°C
–25°C
25°C

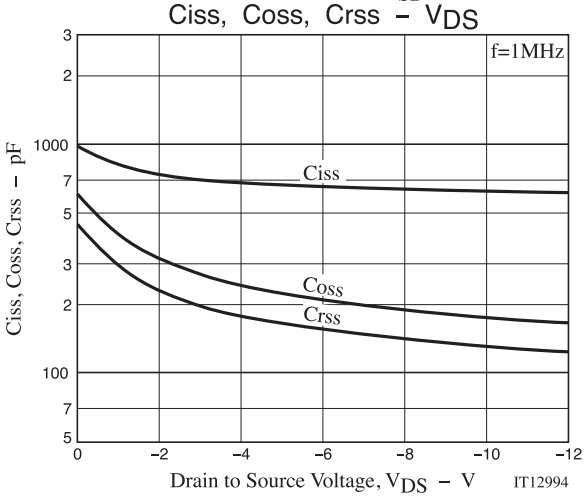

RDS(on) – VGS
Static Drain to Source
On-State Resistance, RDS(on) – mΩ
Gate to Source Voltage, VGS – V
IT12989
Ta=25°C
ID= –0.5A
–1.5A
–3.0A

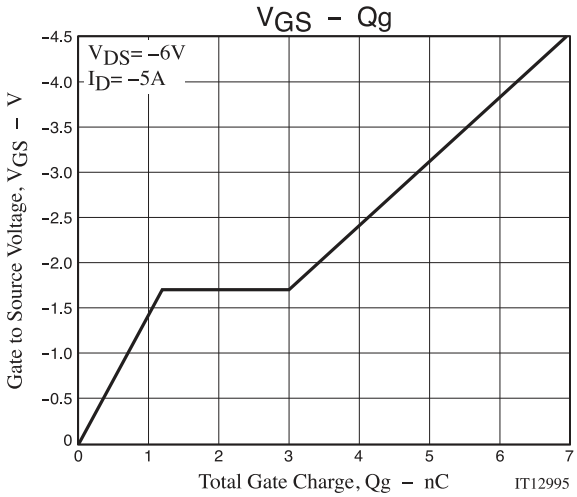

RDS(on) – Ta
Static Drain to Source
On-State Resistance, RDS(on) – mΩ
Ambient Temperature, Ta – °C
IT12990
VGS= –1.8V, ID= –0.5A
VGS= –2.5V, ID= –1.5A
VGS= –4.5V, ID= –3.0A

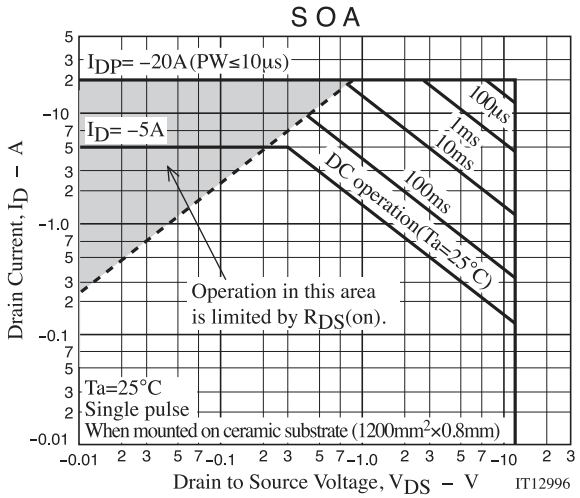

gFS– ID
Forward Transconductance, gFS – S
Drain Current, ID – A
IT12991
VDS= –6V
Ta= –25°C
75°C
25°C

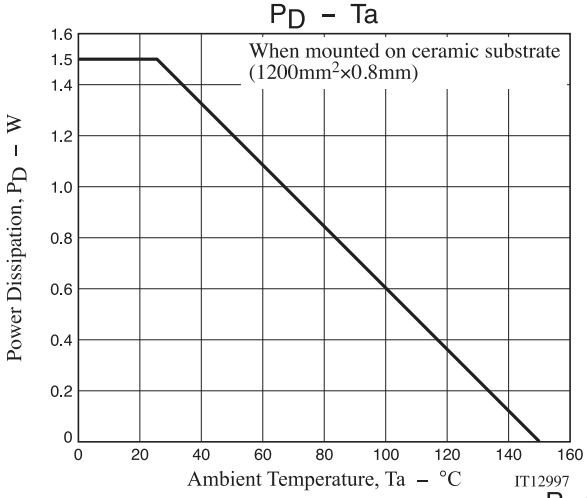

IS – VSD
Source Current, IS – A
Forward Diode Voltage, VSD – V
IT12992
VGS=0V
Ta=75°C
25°C
–25°C

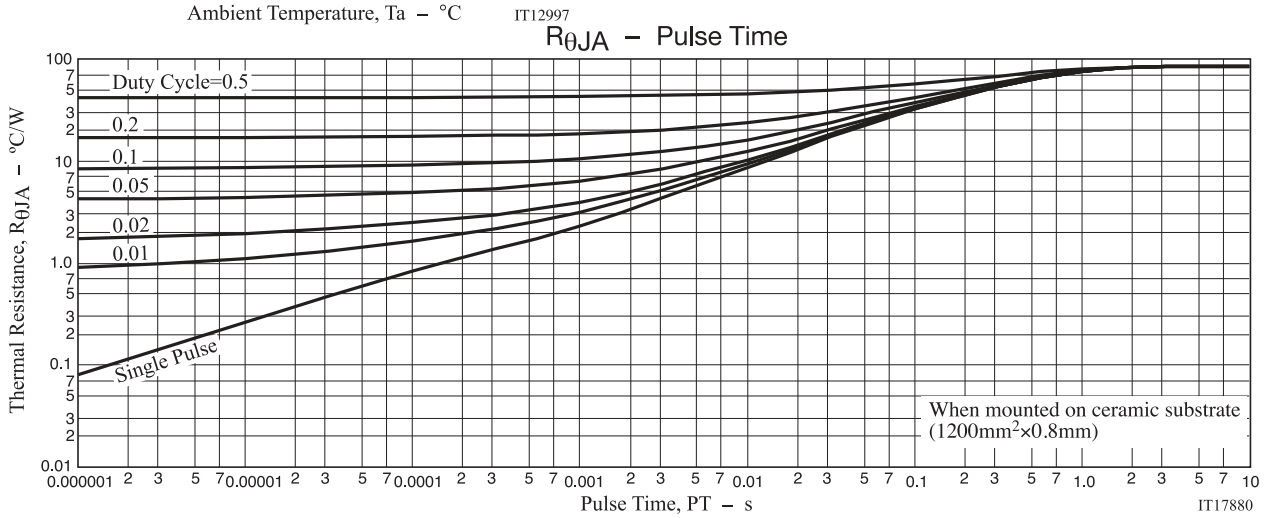

SW Time – ID
Switching Time, SW Time – ns
Drain Current, ID – A
IT12993
VDD= –6V
VGS= –4.5V
td(off)
tf
tr
td(on)


Ciss, Coss, Crss – VDS
Ciss, Coss, Crss – pF
Drain to Source Voltage, VDS – V
IT12994
f=1MHz
Ciss
Coss
Crss


VGS – Qg
VDS= –6V
ID= –5A
Gate to Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT12995


S O A
IDP= –20A(PW≤10μs)
ID= –5A
100μs
1ms
10ms
100ms
DC operation(Ta=25°C)
Operation in this area
is limited by RDS(on).
Ta=25°C
Single pulse
When mounted on ceramic substrate (1200mm2×0.8mm)
Drain Current, ID – A
Drain to Source Voltage, VDS – V
IT12996


PD – Ta
When mounted on ceramic substrate
(1200mm2×0.8mm)
Power Dissipation, PD – W
Ambient Temperature, Ta – °C
IT12997


RθJA – Pulse Time
Duty Cycle=0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse
When mounted on ceramic substrate
(1200mm2×0.8mm)
Thermal Resistance, RθJA – °C/W
Pulse Time, PT – s
IT17880

## Package Dimensions

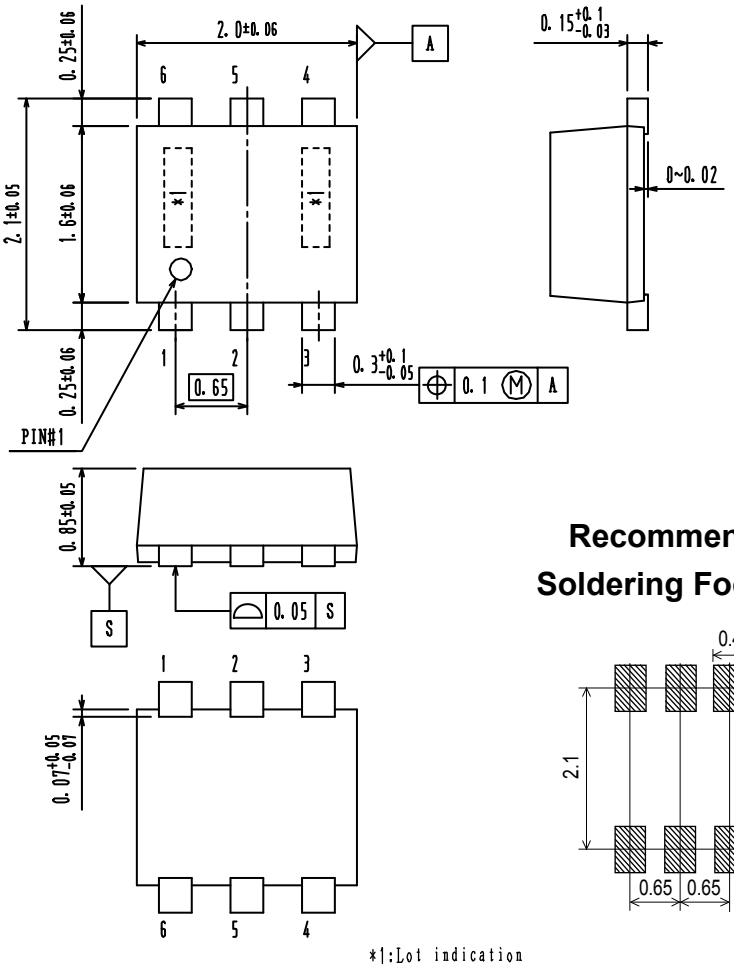
MCH6336-TL-E / MCH6336-TL-H / MCH6336-TL-W

### MCPH6

CASE 419AS
ISSUE O

unit : mm

1 : Drain
2 : Drain
3 : Gate
4 : Source
5 : Drain
6 : Drain




### Recommended Soldering Footprint




## ORDERING INFORMATION

| Device | Package | Shipping | Note |
|---|---|---|---|
| MCH6336-TL-E | MCPH6<br>SC-88FL,SC-70-6,SOT-363 | 3,000 pcs. / Tape & Reel | Pb-Free |
| MCH6336-TL-H | | | Pb-Free<br>and Halogen Free |
| MCH6336-TL-W | | | |

† For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D. http://www.onsemi.com/pub_link/Collateral/BRD8011-D.PDF

Note on usage : Since the MCH6336 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.