# Power MOSFET and Schottky Diode

## General Description

The HM5853 uses advanced trench technology to provide excellent RDSON and low gate charge. Featuring a MOSFET and Schottky Diode, Independent Pin out to each Device to Ease Circuit Design.

| MOSFET | | |
|---|---|---|
| $V_{(BR)DSS}$ | $R_{DS(ON)}$ TYP | $I_D$ MAX |
| -22V | 79mΩ@-4.5V | -3A |
| | 110mΩ@-2.5V | |
| **SHOTTKY DIODE** | | |
| $V_R$ MAX | $V_F$ TYP | $I_F$ MAX |
| 20V | 0.47V | 3A |

## Features

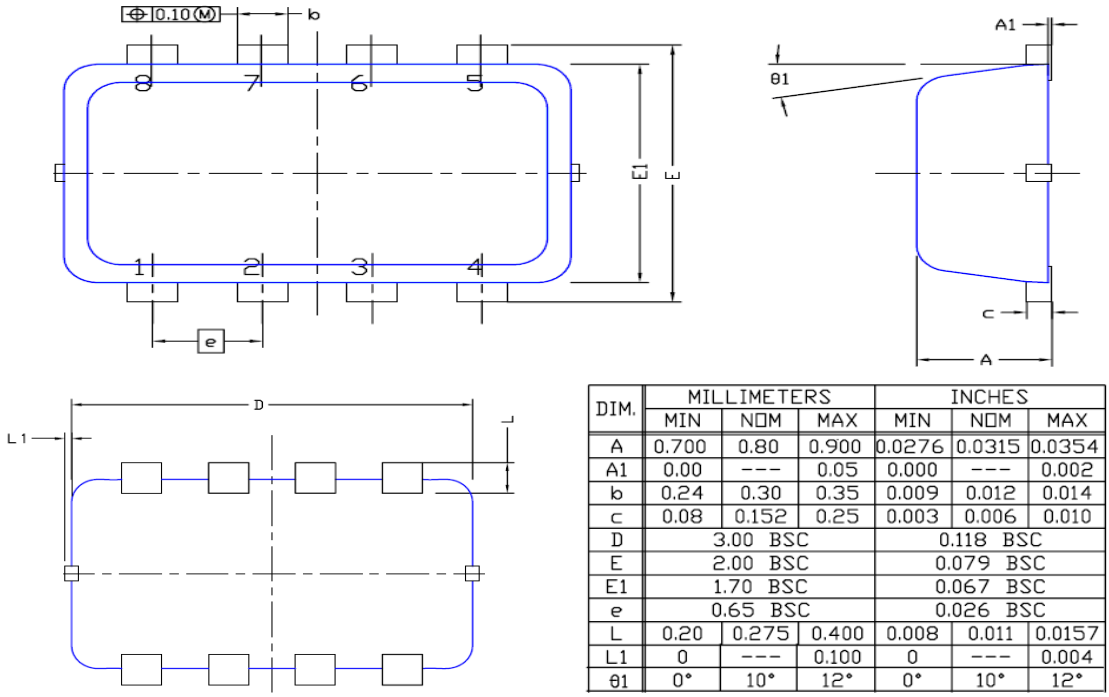
- Leadless SMD Package Featuring a MOSFET and Schottky Diode
- 40% Smaller than TSOP−6 Package
- Leadless SMD Package Provides Great Thermal Characteristics
- Independent Pinout to each Device to Ease Circuit Design
- Trench P−Channel for Low On Resistance
- Ultra Low VF Schottky
- Pb−Free Packages are Available

## Applications

- Li--Ion Battery Charging
- High Side DC-DC Conversion Circuits
- High Side Drive for Small Brushless DC Motors
- Power Management in Portable, Battery Powered Products

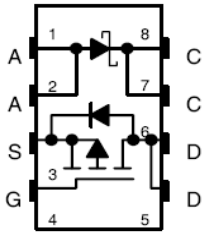
## Package Information

**DFN3x2-8L PAXKAGE OUTLINE DIMENSIONS**

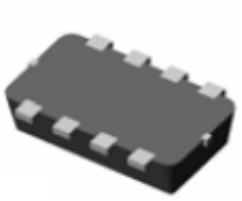



| DIM. | MILLIMETERS | | | INCHES | | |
|---|---|---|---|---|---|---|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.700 | 0.80 | 0.900 | 0.0276 | 0.0315 | 0.0354 |
| A1 | 0.00 | --- | 0.05 | 0.000 | --- | 0.002 |
| b | 0.24 | 0.30 | 0.35 | 0.009 | 0.012 | 0.014 |
| c | 0.08 | 0.152 | 0.25 | 0.003 | 0.006 | 0.010 |
| D | 3.00 BSC | | | 0.118 BSC | | |
| E | 2.00 BSC | | | 0.079 BSC | | |
| E1 | 1.70 BSC | | | 0.067 BSC | | |
| e | 0.65 BSC | | | 0.026 BSC | | |
| L | 0.20 | 0.275 | 0.400 | 0.008 | 0.011 | 0.0157 |
| L1 | 0 | --- | 0.100 | 0 | --- | 0.004 |
| θ1 | 0° | 10° | 12° | 0° | 10° | 12° |

## PIN CONFIGURATION

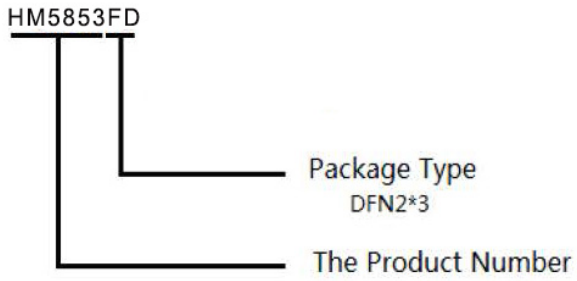



**Pin connections**



**DFN2x3-8L**

## Ordering Information




- **Absolute Maximum Ratings** (TA = 25°C unless otherwise noted)

| Parameter | symbol | value | units |
|---|---|---|---|
| Drain-Source voltage | $V_{(BR)DSS}$ | -22 | V |
| Gate-Source Voltage | $V_{GS}$ | 8 | V |
| Continuous Drain Current | $I_D$ | -3.0 | A |
| Drain Current-Pulsed | $I_{DM}$ | -12 | A |
| Power Dissipation | $P_D$ | 1.1 | W |
| Junction Temperature | $T_J$ | 150 | ℃ |
| Storage Temperature | $T_{stg}$ | -55～150 | ℃ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 110 | ℃/W |

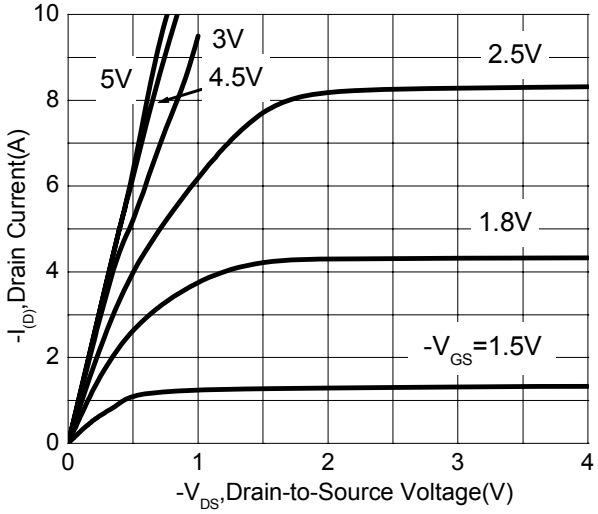
**Electrical Characteristics** (Ta=25°C unless otherwise specified)

| Parameter | Symbol | Test Condition | Min | Type | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$=0V, $I_D$=-250uA | -20 | | | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$= $V_{GS}$, $I_D$=-250uA | -0.5 | -0.69 | -1 | V |
| Gate-Body Leakage | $I_{GSS}$ | $V_{DS}$=0V，$V_{GS}$=8V | | 5 | 100 | nA |
| | | $V_{DS}$=0V，$V_{GS}$=-8V | | -6 | -100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=16V $V_{GS}$=0V | | 6 | 100 | nA |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$=-4.5V,$I_D$=-3.4A | | 79 | 115 | mΩ |
| | | $V_{GS}$=-2.5V,$I_D$=-2.5A | | 110 | 145 | mΩ |
| | | $V_{GS}$=-1.8V,$I_D$=-1.5A | | 215 | 250 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ = 5V,$I_D$=4.5A | | 10 | | S |
| Source-drain (diode forward) voltage | $V_{SD}$ | $V_{GS}$=0V,$I_D$=0.9A | | 0.62 | 1.0 | V |
| **Dynamic Characteristics** | | | | | | |
| Input Capacitance | Ciss | $V_{DS}$=8 V, $V_{GS}$=0 V, F=1MHz | | 580 | | pF |
| Output Capacitance | Coss | | | 110 | | |
| Reverse Transfer Capacitance | Crss | | | 70 | | |
| **Switching Characteristics** | | | | | | |
| Turn-On Delay Time | td(on) | $V_{DD}$=10 V, $R_L$=10 Ω $I_D$=1 A, $V_{GEN}$=4.5 V, Rg=6 Ω | | 8 | 20 | ns |
| Rise Time | tr | | | 10 | 25 | |
| Turn-Off Delay Time | td(off) | | | 35 | 70 | |
| Fall-Time | tf | | | 30 | 60 | |
| Total Gate Charge | Qg | $V_{DS}$=10 V, $V_{GS}$=4.5 V, $I_D$=6A | | 10 | 15 | nc |
| Gate-Source Charge | Qgs | | | 2.3 | | |
| Gate-Drain Charge | Qgd | | | 2.9 | | |

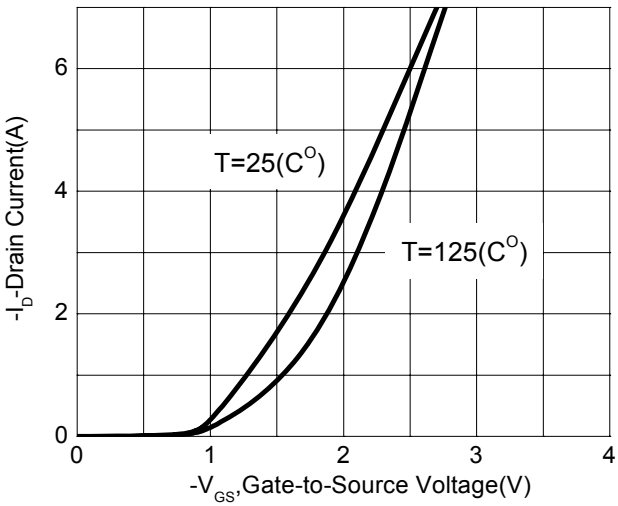
SCHOTTKY DIODE ELECTRICAL CHARACTERISTICS (TJ=25℃, Unless otherwise noted)

| Parameter | Symbol | Test Condition | Min | Type | Max | Unit |
|---|---|---|---|---|---|---|
| Forward voltage | $V_F$ | $I_F$=0.1A | | 0.42 | | V |
| | | $I_F$=0.5A | | 0.47 | | |
| | | $I_F$=1A | | 0.53 | | |
| Reverse current | $I_R$ | $V_R$=10V | | 1.5 | 4 | μA |
| | | $V_R$=20V | | 2.3 | 10 | |

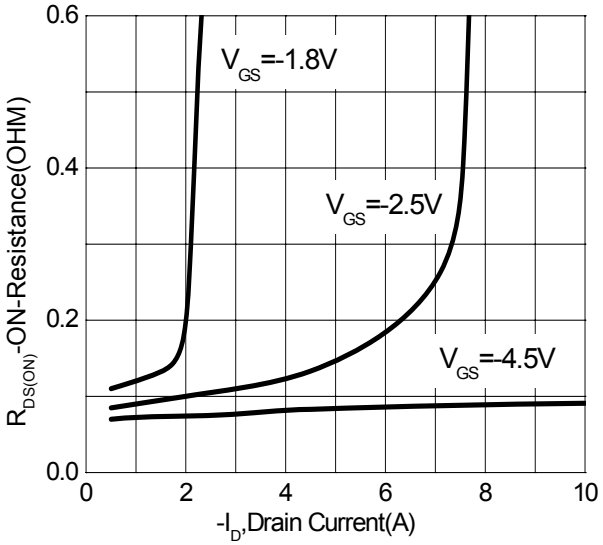
**Output Characteristics**



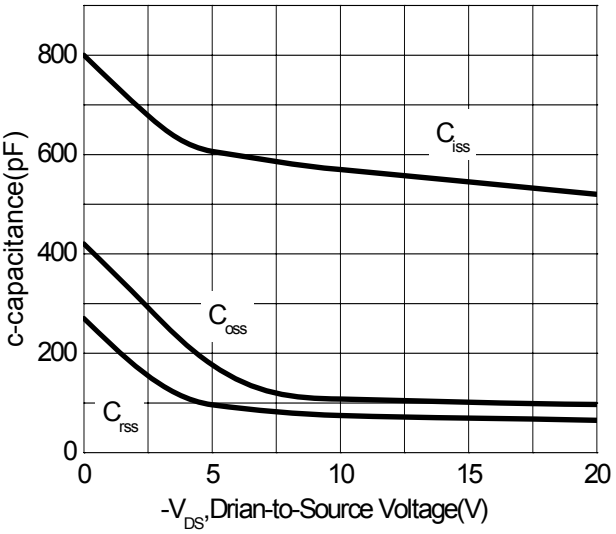

**Transfer Characteristics**



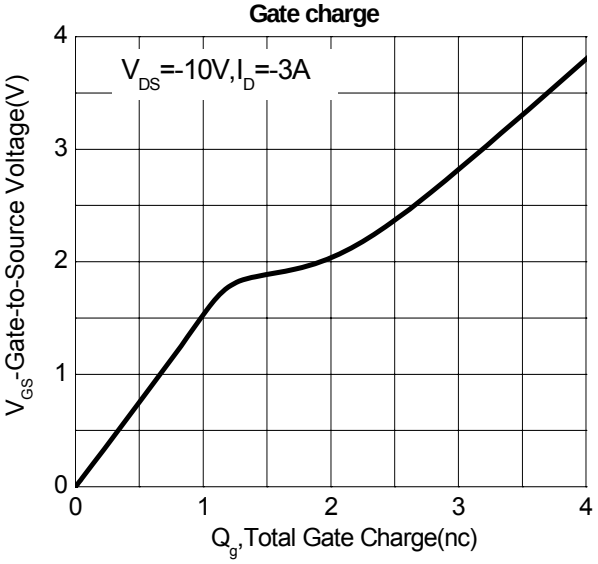

**ON-Resistance VS. Drain Current**



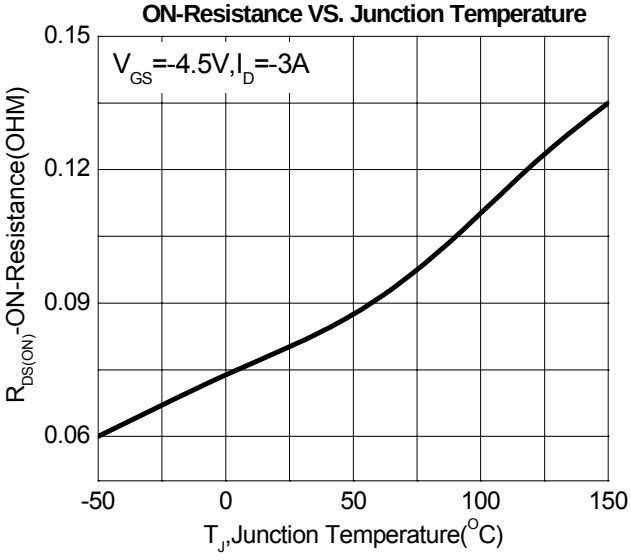

**Capacitance**



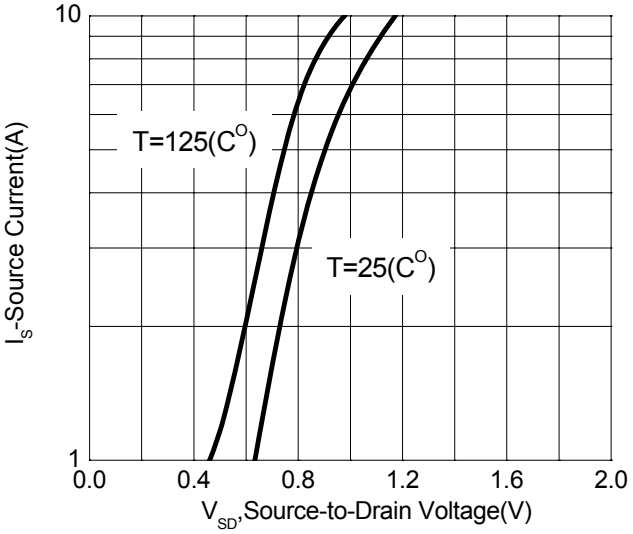

**Gate charge**



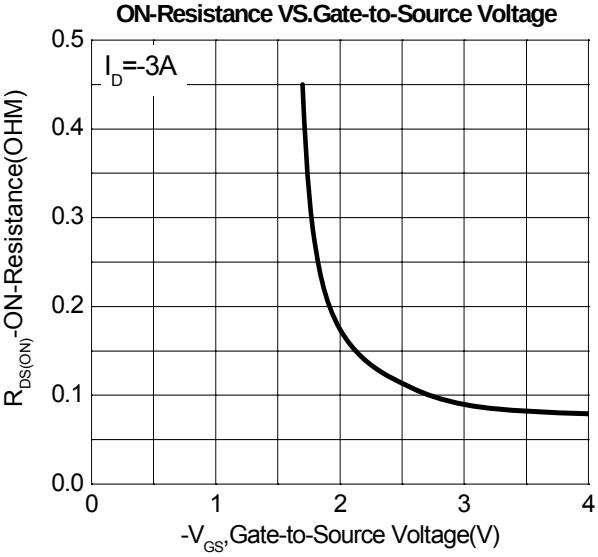

**ON-Resistance VS. Junction Temperature**



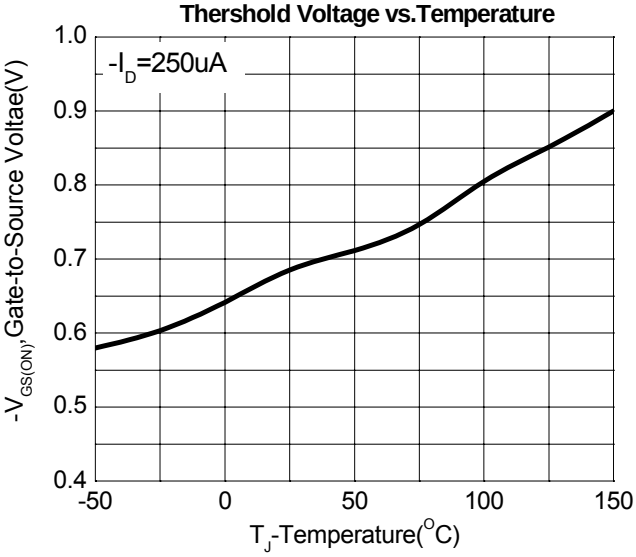
**Source-Drain Diode Forward Voltage**



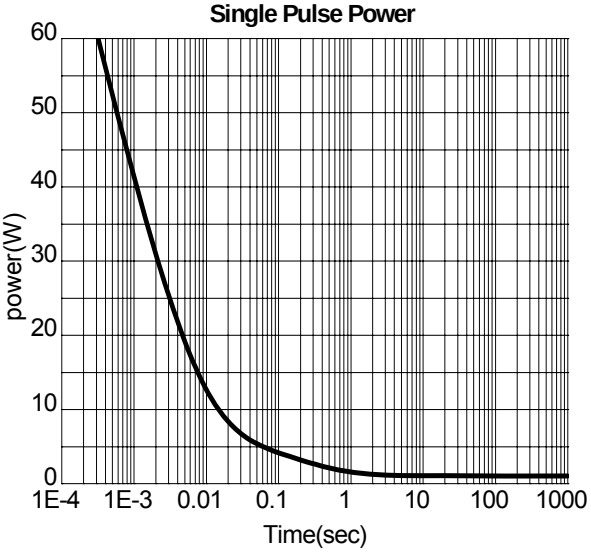

**ON-Resistance VS.Gate-to-Source Voltage**



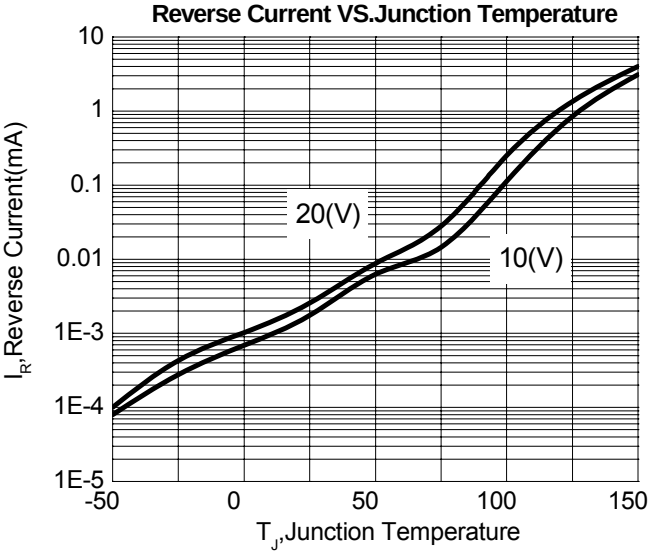

**Thershold Voltage vs.Temperature**




**Single Pulse Power**




**Reverse Current VS.Junction Temperature**




**Schottky Capacitance Characteristics**