# GSMDC2305Z

## 20V P-Channel MOSFETs

### Product Description

These P-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

These devices are well suited for high efficiency fast switching applications.

### Features

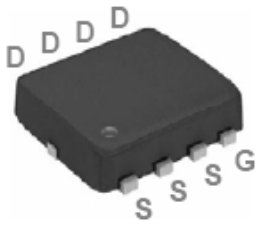
- -20V, -26A, $R_{DS(ON)}$=15mΩ@$V_{GS}$=-4.5V
- Improved dv/dt capability
- Fast switching
- Suit for -1.8V Gate Drive Applications
- Green Device Available
- DFN3X3-8L package design

### Applications

- Notebook
- Load Switch
- Networking
- Hand-Held Instruments

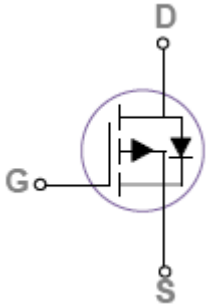
### Packages & Pin Assignments

**GSMDC2305ZFF (DFN3X3-8L)**

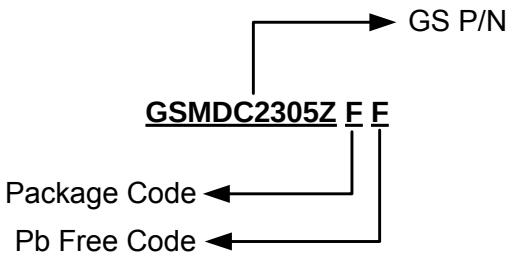



Top View

| Pin | Description |
|---|---|
| 1 | Source |
| 2 | Source |
| 3 | Source |
| 4 | Gate |
| 5 | Drain |
| 6 | Drain |
| 7 | Drain |
| 8 | Drain |

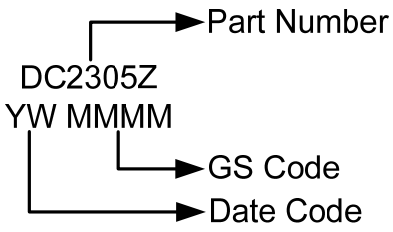


## Ordering Information




| Part Number | Package | Quantity Reel |
|---|---|---|
| GSMDC2305ZFF | DFN3X3-8L | 3000 PCS |

## Marking Information




## Absolute Maximum Ratings

$T_C$=25ºC Unless otherwise noted

| Symbol | Parameter | | Typical | Unit |
|---|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | | -20 | V |
| $V_{GS}$ | Gate-Source Voltage | | ±10 | V |
| $I_D$ | Continuous Drain Current | $T_C$=25℃ | -26 | A |
| | | $T_C$=100℃ | -14 | |
| $I_{DM}$ | Pulsed Drain Current | | -104 | A |
| $P_D$ | Power Dissipation ($T_A$=25℃) | | 2.5 | W |
| | Power Dissipation ($T_C$=25℃) | | 44 | W |
| | Power Dissipation (Derate above 25℃) | | 0.36 | W/℃ |
| $T_J$ | Operating Junction Temperature Range | | -55 to +150 | ℃ |
| $T_{STG}$ | Storage Temperature Range | | -55 to +150 | ℃ |
| $R_{\theta JA}$ | Thermal Resistance-Junction to Ambient | | 50 | ℃/W |
| $R_{\theta JC}$ | Thermal Resistance-Junction to Case | | 2.8 | ℃/W |

Note 1: Repetitive Rating : Pulsed width limited by maximum junction temperature.

## Electrical Characteristics

$T_J$=25℃ Unless otherwise noted

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V,$I_D$=-250uA | -20 | | | V |
| $\triangle BV_{DSS}/\triangle T_J$ | $BV_{DSS}$ Temperature Coefficient | Reference to 25℃, $I_D$=-1mA | | -0.01 | | V/℃ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$,$I_D$=-250uA | -0.3 | -0.6 | -1.0 | V |
| $\triangle V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | | 3 | | mV/℃ |
| $I_{GSS}$ | Gate Leakage Current | $V_{DS}$=0V,$V_{GS}$=±10V | | | ±100 | nA |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=-20V,$V_{GS}$=0V | | | -1 | uA |
| | | $V_{DS}$=-16V,$V_{GS}$=0V, $T_J$=125℃ | | | -10 | |
| $I_S$ | Continuous Source Current | $V_G$=$V_D$=0V, Force Current | | | -11 | A |
| $I_{SM}$ | Pulsed Source Current | | | | -44 | |
| $R_{DS(on)}$ | Drain-Source On-Resistance | $V_{GS}$=-4.5V,$I_D$=-6A | | 12 | 15 | mΩ |
| | | $V_{GS}$=-2.5V,$I_D$=-4A | | 15 | 20 | |
| | | $V_{GS}$=-1.8V,$I_D$=-3A | | 20 | 26 | |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$=-10V,$I_D$=-6A | | 20 | | S |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V,$I_S$=-1A | | | -1 | V |
| **Dynamic** | | | | | | |
| $Q_g$ | Total Gate Charge | $V_{DS}$=-10V,$V_{GS}$=-4.5V, $I_D$=-6A | | 27 | 40 | nC |
| $Q_{gs}$ | Gate-Source Charge | | | 2.4 | 4.8 | |
| $Q_{gd}$ | Gate-Drain Charge | | | 5.3 | 8 | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=-15V,$V_{GS}$=0V, f=1MHz | | 2320 | 3370 | pF |
| $C_{oss}$ | Output Capacitance | | | 280 | 410 | |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 175 | 260 | |
| $t_{d(on)}$ | Turn-On Time | $V_{DD}$=-10V,$I_D$=-1A, $V_{GS}$=-4.5V,$R_G$=25Ω | | 16.2 | 31 | ns |
| $t_r$ | | | | 43.5 | 83 | |
| $t_{d(off)}$ | Turn-Off Time | | | 114 | 217 | |
| $t_f$ | | | | 28.8 | 55 | |

Note 2: The data tested by pulsed, pulse width≦300us, duty cycle≦2%.

Note 3: Essentially independent of operating temperature.

## Typical Performance Characteristics

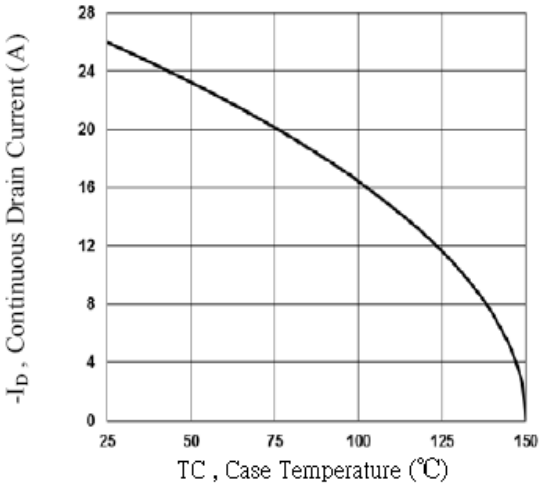



**Fig.1 Continuous Drain Current vs. $T_c$**

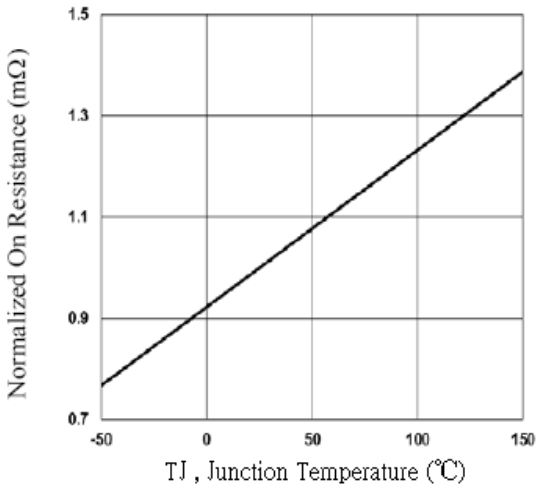



**Fig.2 Normalized RDSON vs. $T_J$**

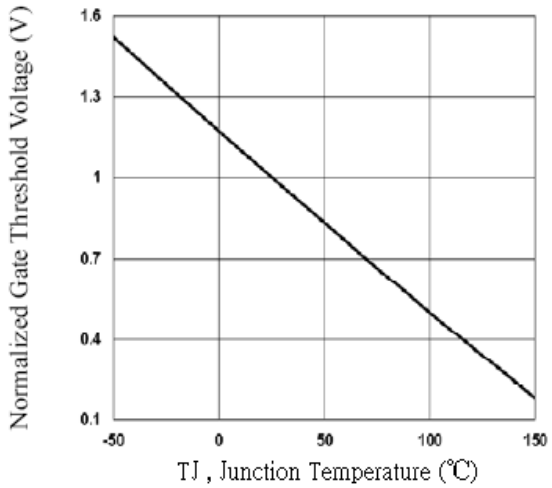



**Fig.3 Normalized $V_{th}$ vs. $T_J$**

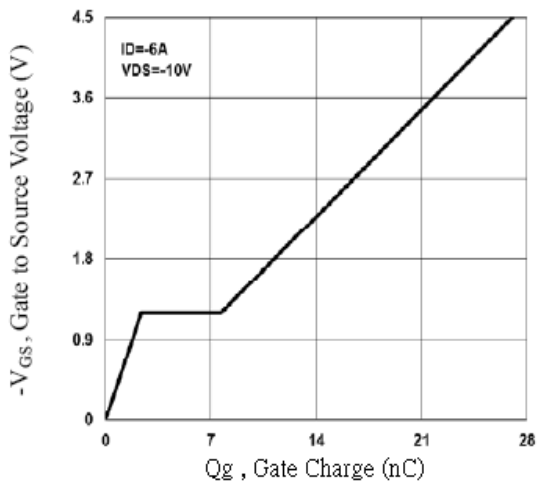



**Fig.4 Gate Charge Waveform**

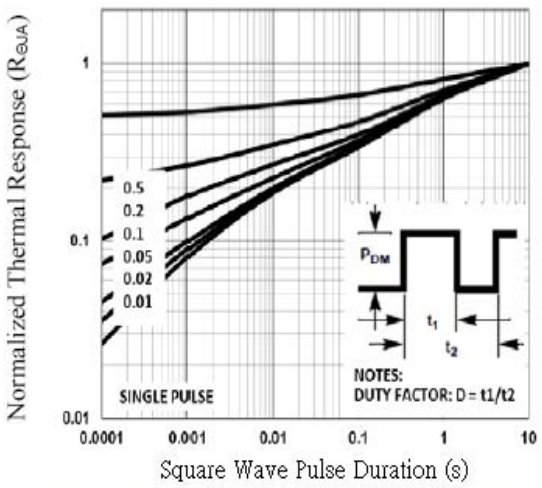



**Fig.5 Normalized Transient Response**

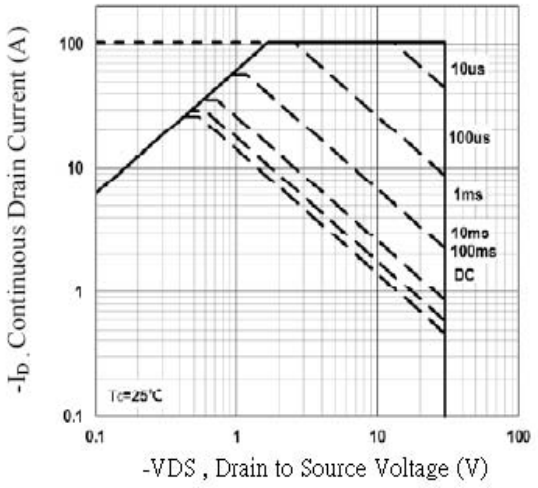
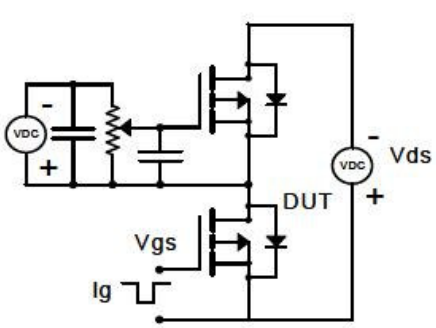
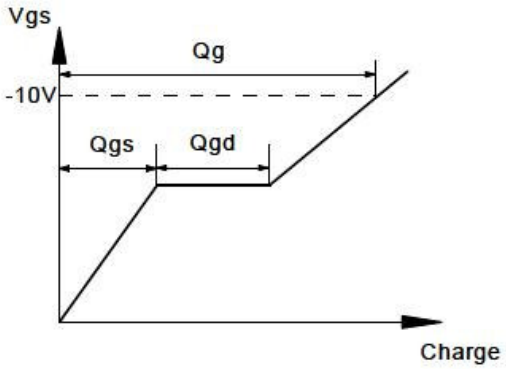



**Fig.6 Maximum Safe Operation Area**

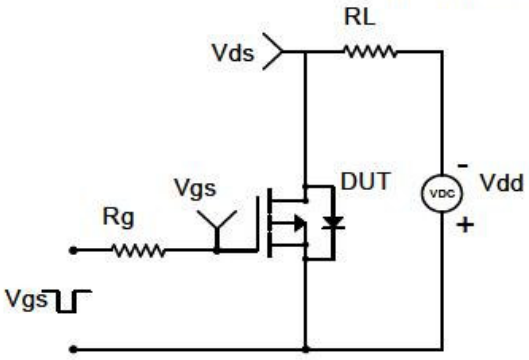
## Typical Performance Characteristics (Continue)

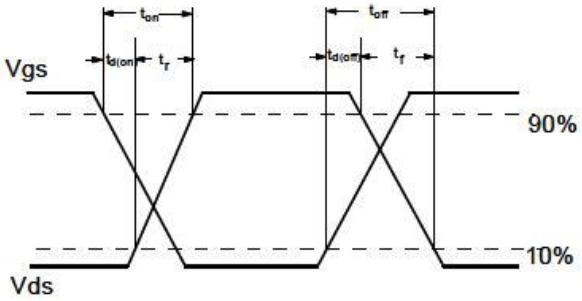
Gate Charge Test Circuit & Waveform



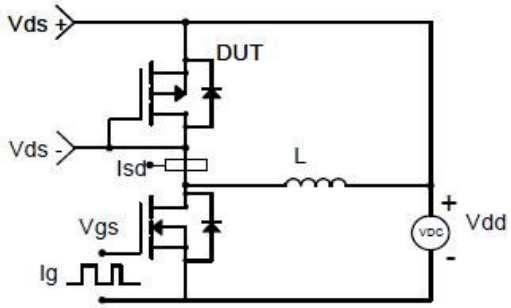



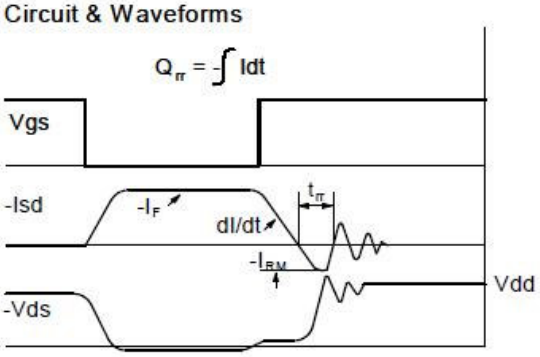

Resistive Switching Test Circuit & Waveforms



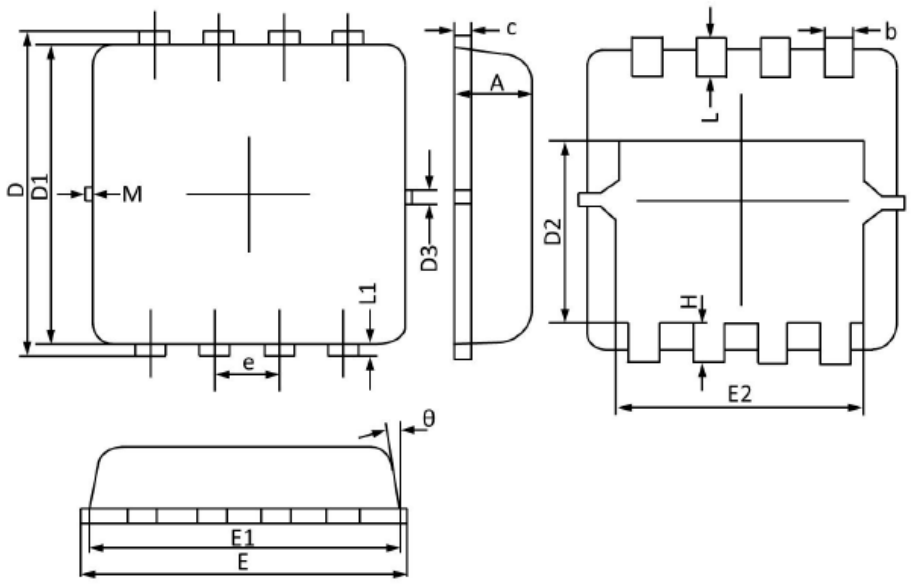

Diode Recovery Test Circuit & Waveforms



## Package Dimension

# DFN3X3-8L




| Dimensions | | | | |
|---|---|---|---|---|
| Symbol | Millimeters | | Inches | |
| | Min | Max | Min | Max |
| A | 0.700 | 0.800 | 0.028 | 0.031 |
| b | 0.250 | 0.350 | 0.010 | 0.013 |
| c | 0.100 | 0.250 | 0.004 | 0.009 |
| D | 3.250 | 3.450 | 0.128 | 0.135 |
| D1 | 3.000 | 3.200 | 0.119 | 0.125 |
| D2 | 1.780 | 1.980 | 0.070 | 0.077 |
| D3 | 0.130 (REF) | | 0.005 (REF) | |
| E | 3.200 | 3.400 | 0.126 | 0.133 |
| E1 | 3.000 | 3.200 | 0.119 | 0.125 |
| E2 | 2.390 | 2.590 | 0.094 | 0.102 |
| e | 0.650 (BSC) | | 0.026 (BSC) | |
| H | 0.300 | 0.500 | 0.011 | 0.019 |
| L | 0.300 | 0.500 | 0.011 | 0.019 |
| L1 | 0.130 (REF) | | 0.005 (REF) | |
| $\theta$ | 0° | 12° | 0° | 12° |
| M | 0.150 (REF) | | 0.006 (REF) | |

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