## Features

- Trench LV MOSFET Technology
- High Dense Cell Design for Extremely Low $R_{DS(ON)}$
- Moisture Sensitivity Level 1
- Halogen Free. “Green” Device (Note 1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

# N-Channel MOSFET

## Maximum Ratings

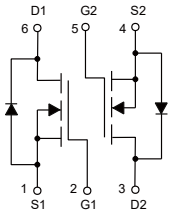
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Maximum Thermal Resistance: 89°C/W Junction to Ambient(Note 2)

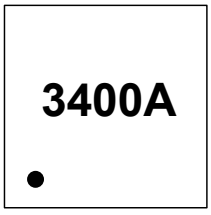
| Parameter | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 30 | V |
| Gate-Source Volltage | | $V_{GS}$ | ±12 | V |
| Continuous Drain Current | $T_A$=25°C | $I_D$ | 5 | A |
| | $T_A$=70°C | | 4 | |
| Pulsed Drain Current (Note 3) | | $I_{DM}$ | 20 | A |
| Total Power Dissipation (Note 4) | | $P_D$ | 1.4 | W |

Note:

1. Halogen free "Green” products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of RthJA is measured with the device mounted on 1 in2 FR-4 board with 2oz. copper, in a still air environment with $T_A$=25°C
3. Repetitive rating; pulse width limited by max. junction temperature.
4. $P_D$ is based on max. junction temperature, using junction-ambient thermal resistance.

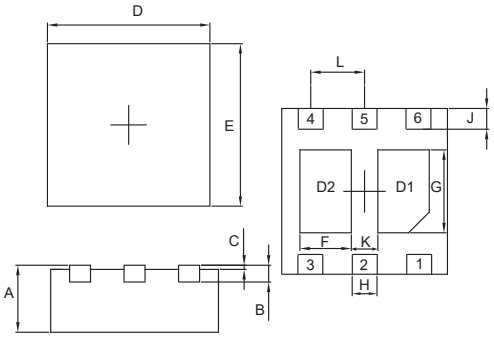
## Internal Structure and Marking Code




Pin1

## DFN2020-6L




| DIMENSIONS | | | | | |
|---|---|---|---|---|---|
| DIM | INCHES | | MM | | NOTE |
| | MIN | MAX | MIN | MAX | |
| A | 0.030 | 0.034 | 0.750 | 0.850 | |
| B | 0.008 | | 0.200 | | TYP. |
| C | 0.000 | 0.002 | 0.000 | 0.050 | |
| D | 0.077 | 0.081 | 1.950 | 2.050 | |
| E | 0.077 | 0.081 | 1.950 | 2.050 | |
| F | 0.017 | 0.027 | 0.440 | 0.690 | |
| G | 0.033 | 0.043 | 0.840 | 1.090 | |
| H | 0.010 | 0.014 | 0.250 | 0.350 | |
| J | 0.007 | 0.015 | 0.175 | 0.375 | |
| K | 0.010 | 0.014 | 0.250 | 0.350 | |
| L | 0.026 | | 0.650 | | TYP. |

## Electrical Characteristics @ 25°C (Unless Otherwise Specified)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$=0V, $I_D$=250μA | 30 | | | V |
| Gate-Source Leakage Current | $I_{GSS}$ | $V_{DS}$=0V, $V_{GS}$ =±12V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=24V, $V_{GS}$=0V | | | 1 | μA |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250μA | 0.7 | 0.9 | 1.5 | V |
| Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$=10V, $I_D$=5.8A | | 24 | 32 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=5A | | 27 | 38 | |
| | | $V_{GS}$=2.5V, $I_D$=4A | | 32 | 45 | |
| Gate Resistance | $R_G$ | f=1MHz, Open drain | | 1.7 | | Ω |
| **Diode Characteristics** | | | | | | |
| Continuous Body Diode Current | $I_S$ | | | | 5 | A |
| Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V, $I_S$=1A | | | 1 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_F$=5A, $dI_F/dt$=280A/μs | | 10 | | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | | 11 | | nC |
| **Dynamic Characteristics** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=15V,$V_{GS}$=0V,f=1MHz | | 645 | | pF |
| Output Capacitance | $C_{oss}$ | | | 58 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 50 | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=15V,$V_{GS}$=10V,$I_D$=5A | | 16 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 1.5 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 2.3 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$=20V, $V_{GS}$=10V, $R_G$=2.2Ω, $I_D$=5A | | 7 | | ns |
| Turn-On Rise Time | $t_r$ | | | 28 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 18 | | |
| Turn-Off Fall Time | $t_f$ | | | 2 | | |

## Curve Characteristics

**Fig. 1 Typical Output Characteristics**

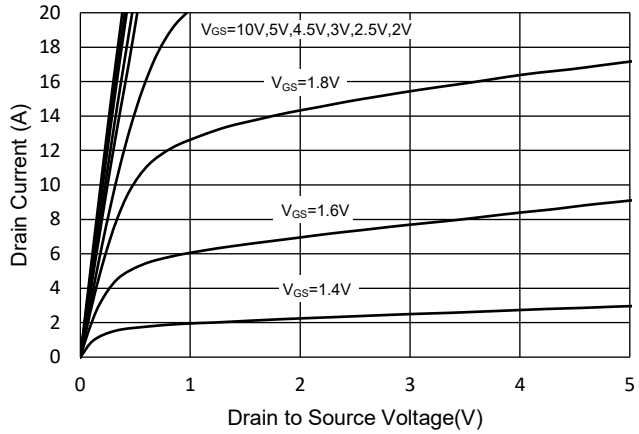



**Fig.2 Transfer Characteristic**

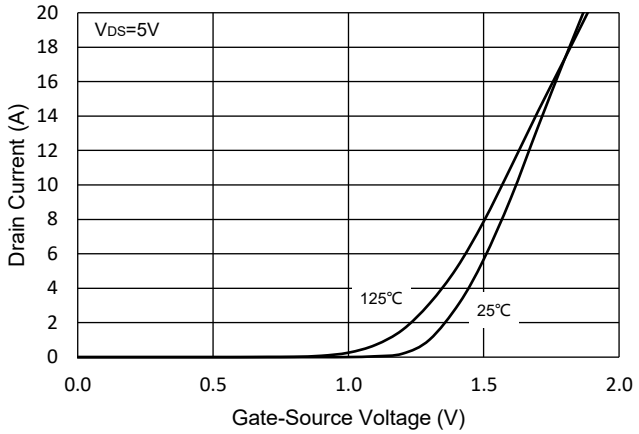



**Fig.3 Rdson-Vgs**

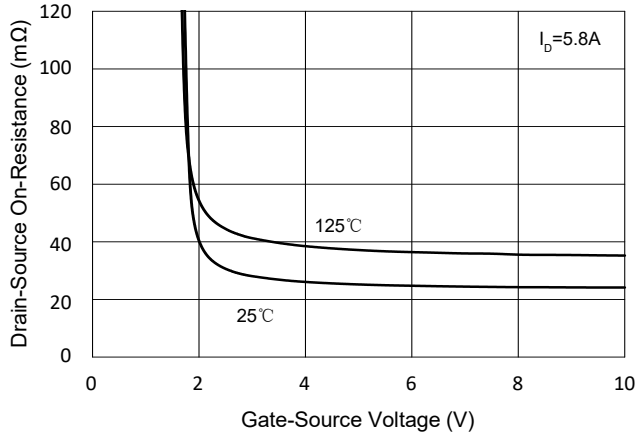



**Fig.4 RDS(ON)-ID**

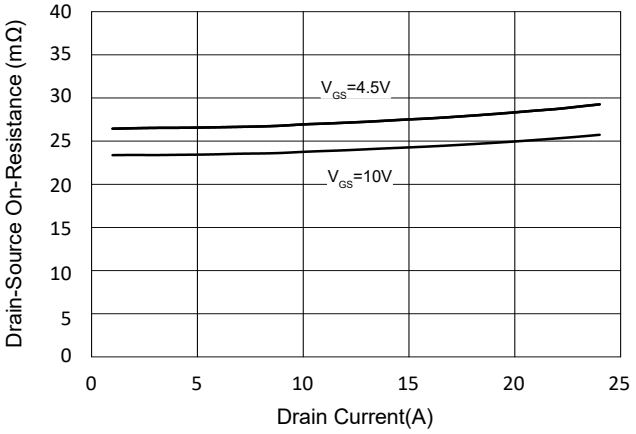



**Fig.5 Capacitance Characteristics**

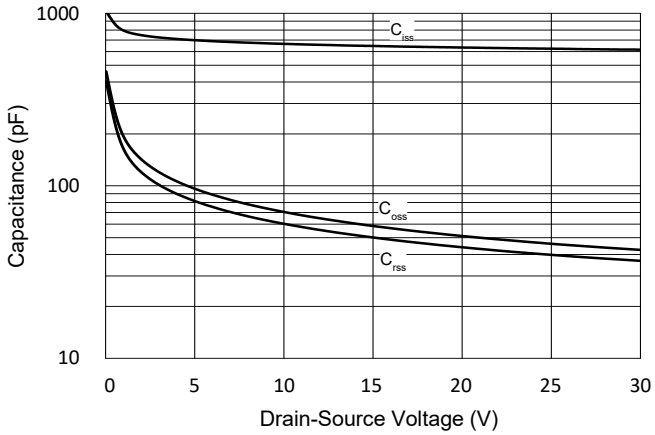
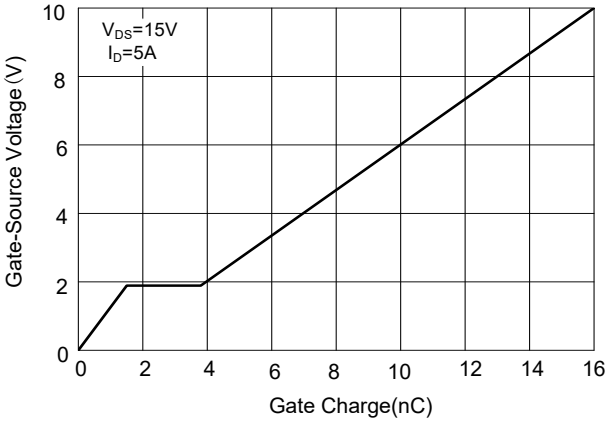



**Fig.6 Gate Charge**



## Curve Characteristics

**Fig.7 Normalized Threshold Voltage**

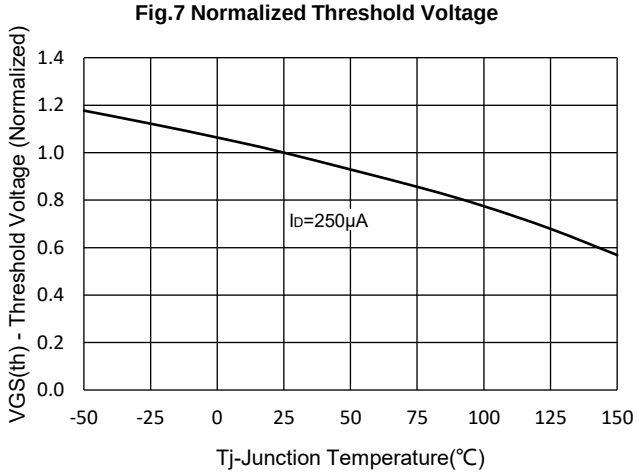



**Fig.8 Normalized On Resistance Characteristics**

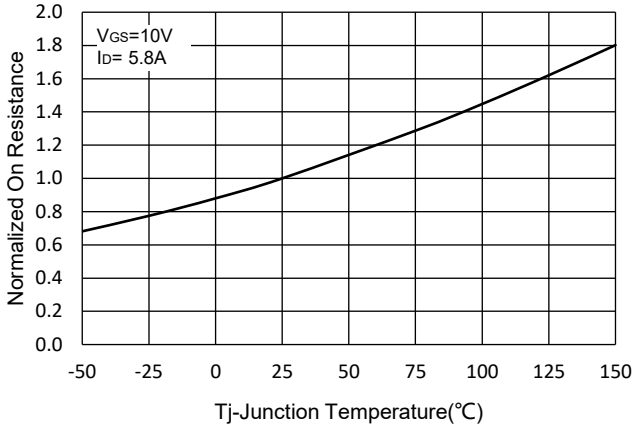



**Fig.9 IS-VSD**

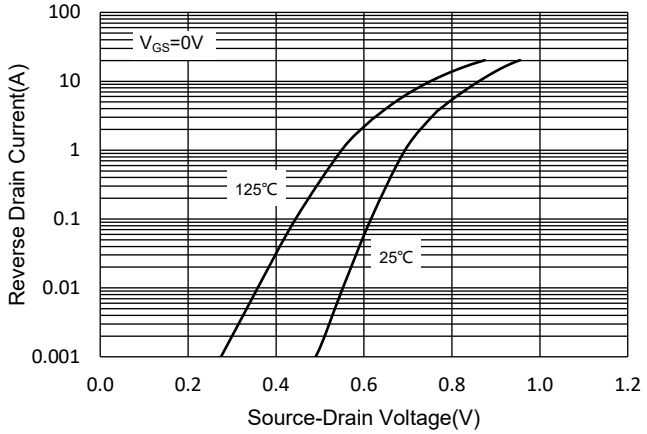



**Fig.10 Drain Current**

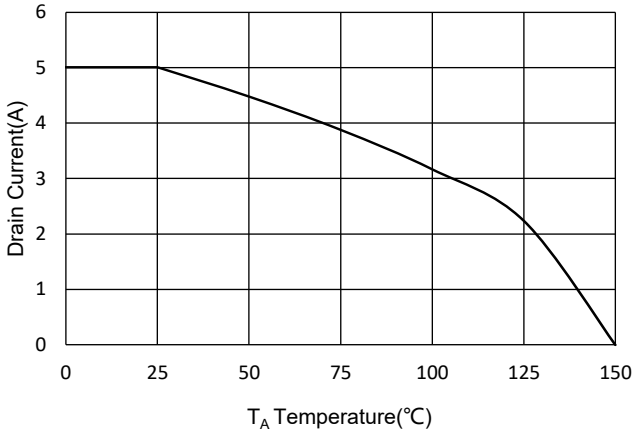
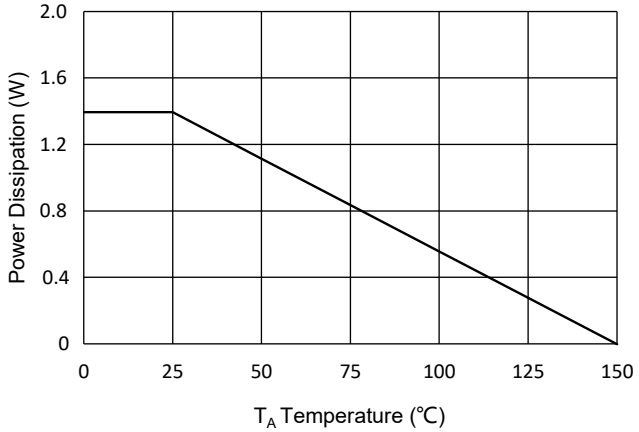



**Fig.11 Power Dissipation**



## Curve Characteristics

**Fig.12 Safe Operation Area**

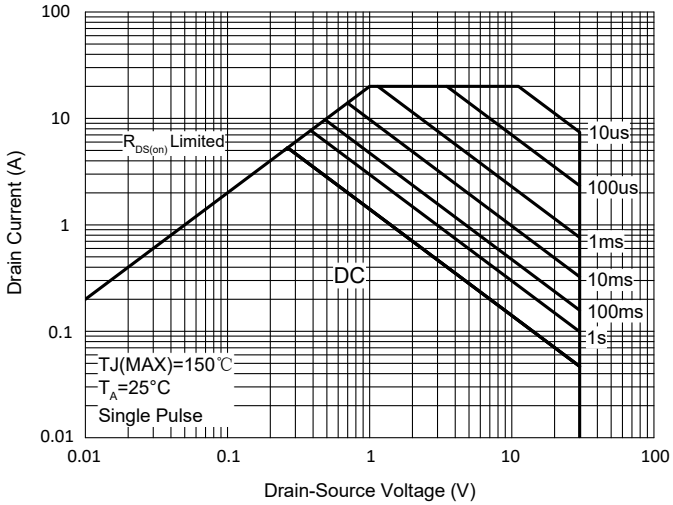
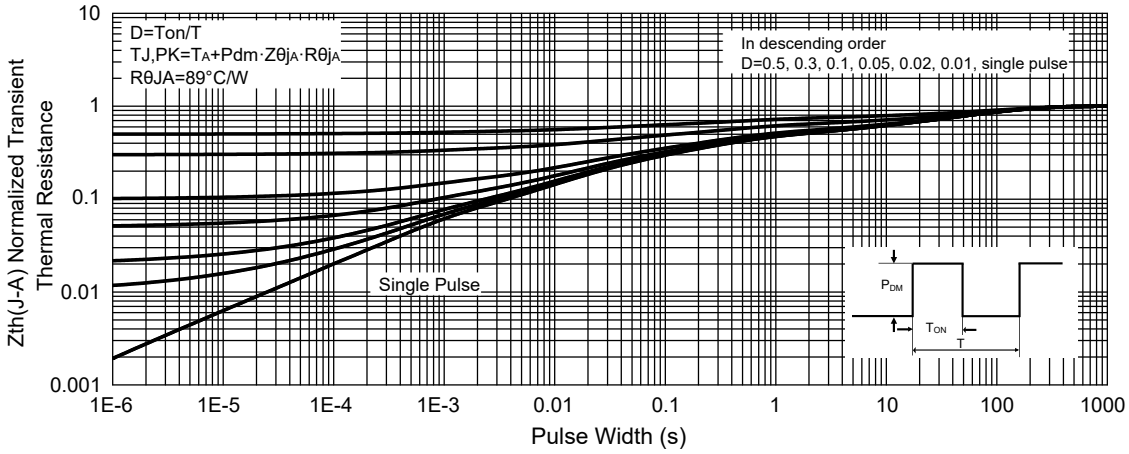



**Fig.13 Normalized Transient Thermal Impedance**



## Ordering Information

| Device | Packing |
|---|---|
| Part Number-TP | Tape&Reel:3Kpcs/Reel |