# SeCoS
## Elektronische Bauelemente

## SSD20N06
### 20A , 60V , $R_{DS(ON)}$ 40mΩ
### N-Ch Enhancement Mode Power MOSFET

## DESCRIPTION

The SSD20N06 is the highest performance trench N-ch MOSFETs with extreme high cell density , which provide excellent $R_{DS(on)}$ and gate charge for most of the synchronous buck converter applications.

The SSD20N06 meet the RoHS and Green Product requirement with full function reliability approved.

## FEATURES

- Advanced high cell density Trench technology
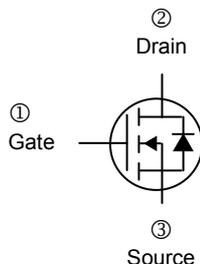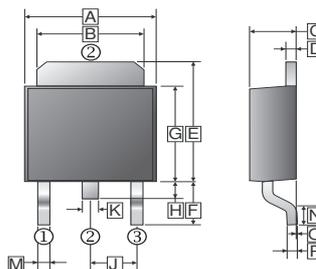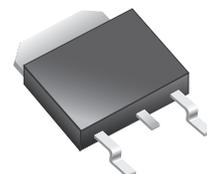- Super Low Gate Charge
- Green Device Available

## MARKING

20N06
☐☐☐☐ ← Date Code

## PACKAGE INFORMATION

| Package | MPQ | Leader Size |
|---|---|---|
| TO-252 | 2.5K | 13 inch |

### TO-252(D-Pack)

② Drain

① Gate

③ Source

| REF. | Millimeter Min. | Millimeter Max. | REF. | Millimeter Min. | Millimeter Max. |
|---|---|---|---|---|---|
| A | 6.35 | 6.9 | J | 2.3 REF. | |
| B | 4.95 | 5.53 | K | 0.89 REF. | |
| C | 2.1 | 2.5 | M | 0.45 | 1.14 |
| D | 0.41 | 0.9 | N | 1.55 Typ. | |
| E | 6 | 7.5 | O | 0 | 0.13 |
| F | 2.90 REF | | P | 0.58 REF. | |
| G | 5.4 | 6.4 | | | |
| H | 0.6 | 1.2 | | | |

## ABSOLUTE MAXIMUM RATINGS

| Parameter | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 60 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current @$V_{GS}$=10V [1] | $T_C$=25°C | $I_D$ | 20 | A |
| | $T_C$=100°C | | 13 | A |
| | $T_A$=25°C | | 5 | A |
| | $T_A$=70°C | | 4 | A |
| Pulsed Drain Current [3] | | $I_{DM}$ | 40 | A |
| Total Power Dissipation | $T_C$=25°C | $P_D$ | 31.3 | W |
| | $T_A$=25°C | | 2 | |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55~150 | °C |
| **Thermal Resistance Rating** | | | | |
| Maximum Thermal Resistance Junction-Ambient [1] | | $R_{θJA}$ | 62.5 | °C / W |
| Maximum Thermal Resistance Junction-Ambient [2] | | | 110 | |
| Maximum Thermal Resistance Junction-Case [1] | | $R_{θJC}$ | 4 | |

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

| Parameter | | Symbol | Min. | Typ. | Max. | Unit | Teat Conditions |
|---|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | | $BV_{DSS}$ | 60 | - | - | V | $V_{GS}$=0, $I_D$=250µA |
| Gate-Threshold Voltage | | $V_{GS(th)}$ | 1 | - | 2.5 | V | $V_{DS}$=$V_{GS}$, $I_D$=250µA |
| Forward Transfer conductance | | $g_{fs}$ | - | 25 | - | S | $V_{DS}$=5V, $I_D$=15A |
| Gate-Source Leakage Current | | $I_{GSS}$ | - | - | ±100 | nA | $V_{GS}$= ±20V |
| Drain-Source Leakage Current | $T_J$=25°C | $I_{DSS}$ | - | - | 1 | µA | $V_{DS}$=48V, $V_{GS}$=0 |
| | $T_J$=55°C | | - | - | 5 | | $V_{DS}$=48V, $V_{GS}$=0 |
| Static Drain-Source On-Resistance [4] | | $R_{DS(ON)}$ | - | - | 40 | mΩ | $V_{GS}$=10V, $I_D$=15A |
| | | | - | - | 50 | | $V_{GS}$=4.5V, $I_D$=7A |
| Total Gate Charge | $V_{GS}$=4.5V | $Q_g$ | - | 9.5 | - | nC | $I_D$=15A $V_{DS}$=48V $V_{GS}$=10V |
| Total Gate Charge | | $Q_g$ | - | 19 | - | | |
| Gate-Source Charge | | $Q_{gs}$ | - | 2.5 | - | | |
| Gate-Drain Change | | $Q_{gd}$ | - | 5 | - | | |
| Turn-on Delay Time | | $T_{d(on)}$ | - | 2.8 | - | nS | $V_{DD}$=30V $I_D$=15A $V_{GS}$=10V $R_G$=3.3 Ω |
| Rise Time | | $T_r$ | - | 16.6 | - | | |
| Turn-off Delay Time | | $T_{d(off)}$ | - | 21.2 | - | | |
| Fall Time | | $T_f$ | - | 5.6 | - | | |
| Input Capacitance | | $C_{iss}$ | - | 1027 | - | pF | $V_{GS}$ =0 $V_{DS}$=15V f =1.0MHz |
| Output Capacitance | | $C_{oss}$ | - | 65 | - | | |
| Reverse Transfer Capacitance | | $C_{rss}$ | - | 46 | - | | |
| **Source-Drain Diode** | | | | | | | |
| Continuous Source Current [1] | | $I_S$ | - | - | 20 | A | |
| Pulsed Source Current [3] | | $I_{SM}$ | - | - | 40 | A | |
| Diode Forward Voltage [4] | | $V_{SD}$ | - | - | 1.2 | V | $I_S$=1A, $V_{GS}$=0 |
| Reverse Recovery Time | | $T_{rr}$ | - | 12.2 | - | nS | $I_F$=15A, dI/dt=100A/µs , $T_J$=25°C |
| Reverse Recovery Charge | | $Q_{rr}$ | - | 7.3 | - | nC | |

Notes:
1. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
2. When mounted on min. copper pad.
3. The power dissipation is limited by 150°C junction temperature.
4. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%

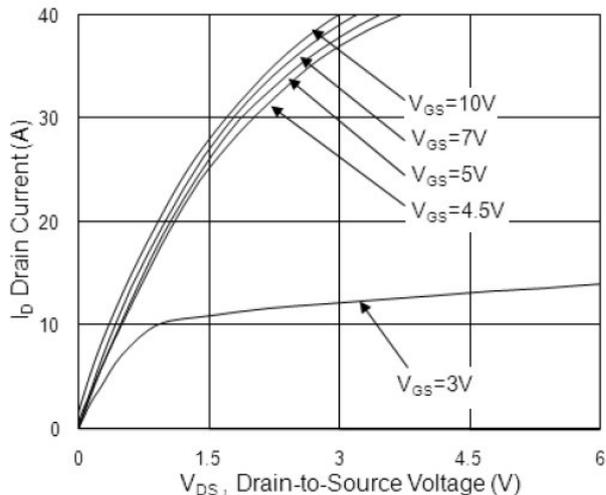## CHARACTERISTIC CURVES



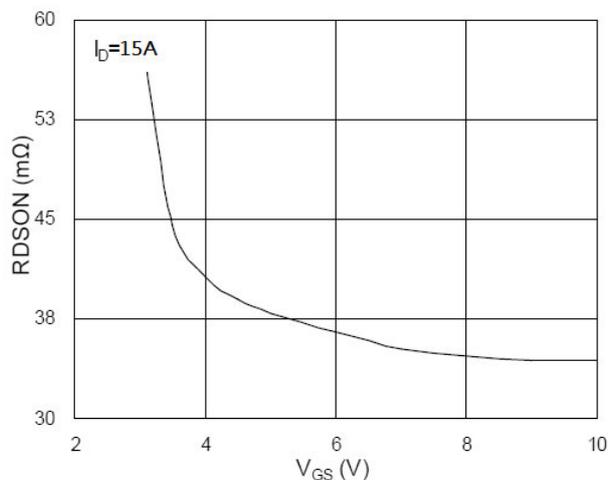**Fig.1 Typical Output Characteristics**



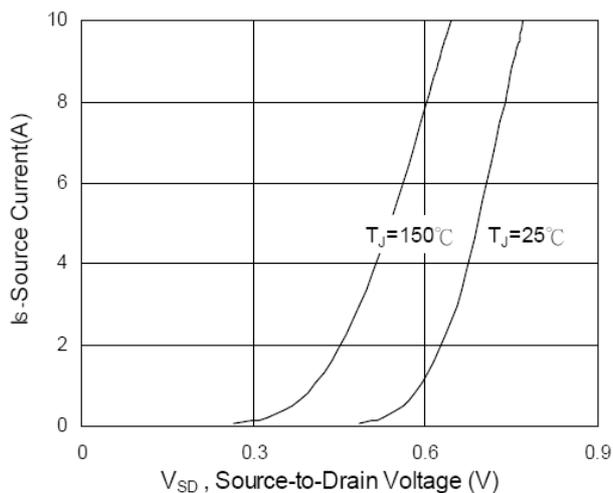**Fig.2 On-Resistance vs. Gate-Source**



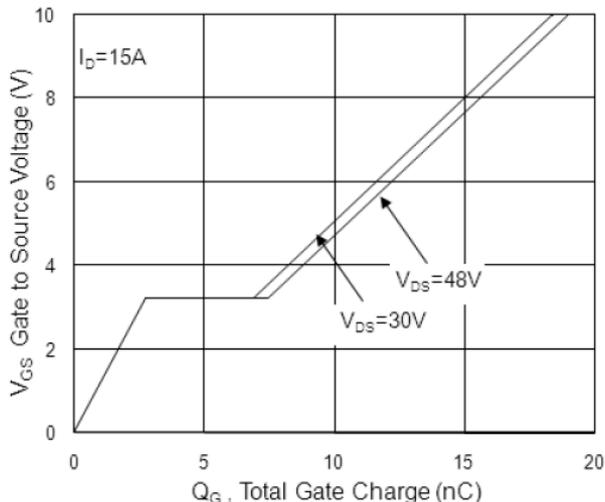**Fig.3 Forward Characteristics Of Reverse**



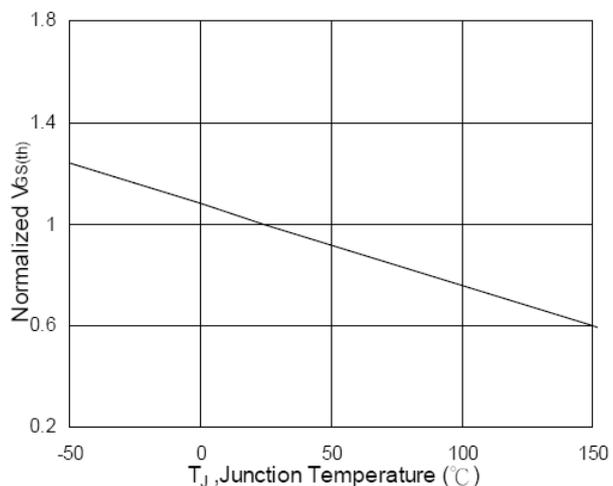**Fig.4 Gate-Charge Characteristics**



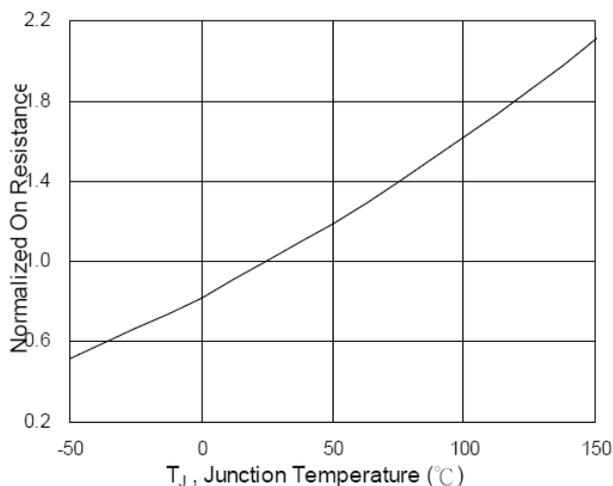**Fig.5 Normalized V$_{GS(th)}$ vs. T$_J$**



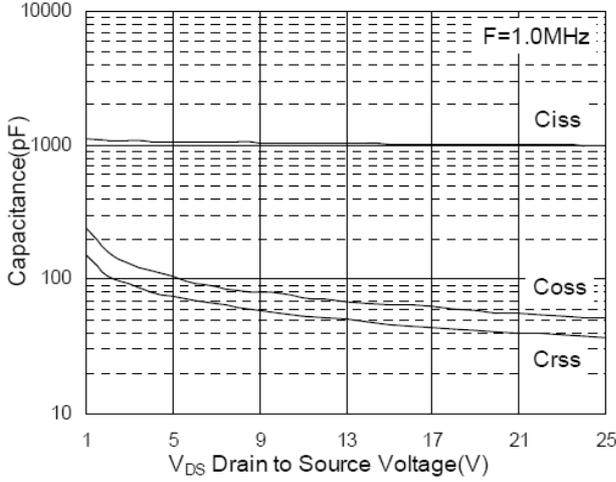**Fig.6 Normalized R$_{DSON}$ vs. T$_J$**

## CHARACTERISTIC CURVES



**Fig.7 Capacitance**
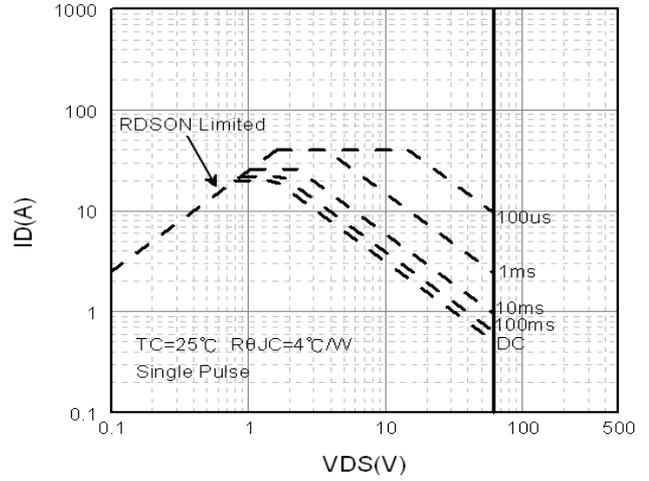


**Fig.8 Safe Operating Area**



$$D = T_{ON}/T$$
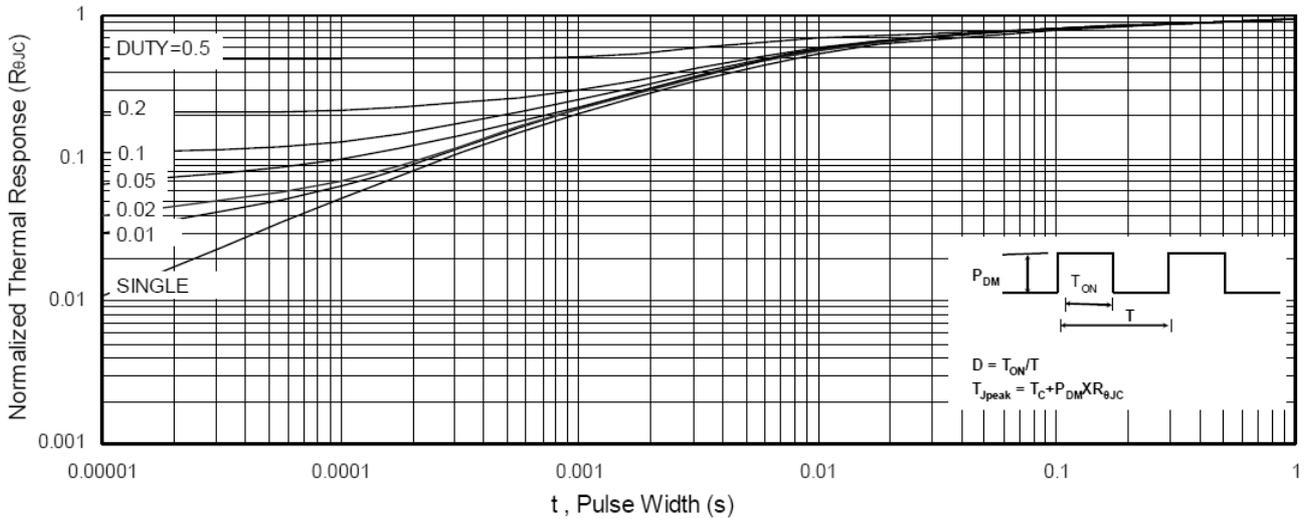$$T_{Jpeak} = T_C + P_{DM} \times R_{\theta JC}$$
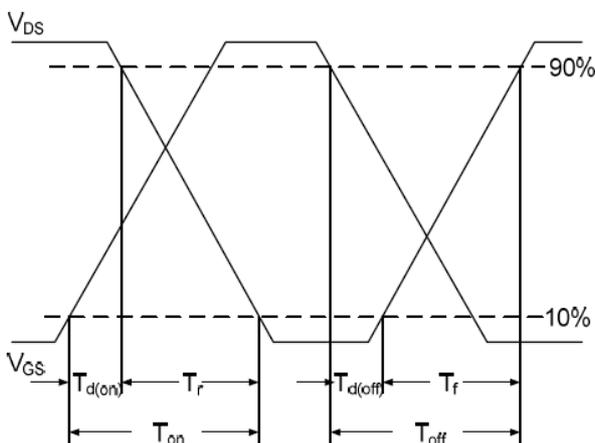
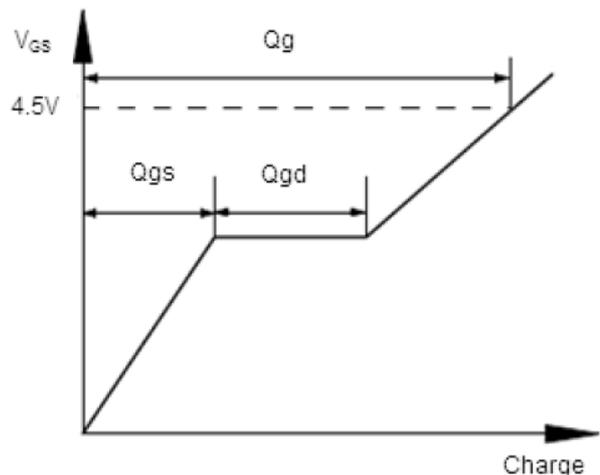**Fig.9 Normalized Maximum Transient Thermal Impedance**



**Fig.10 Switching Time Waveform**



**Fig.11 Gate Charge Waveform**