Elektronische Bauelemente

# SSU50N10

**54A , 100V , $R_{DS(ON)}$ 22mΩ**

**N-Ch Enhancement Mode Power MOSFET**

RoHS Compliant Product
A suffix of "-C" specifies halogen free

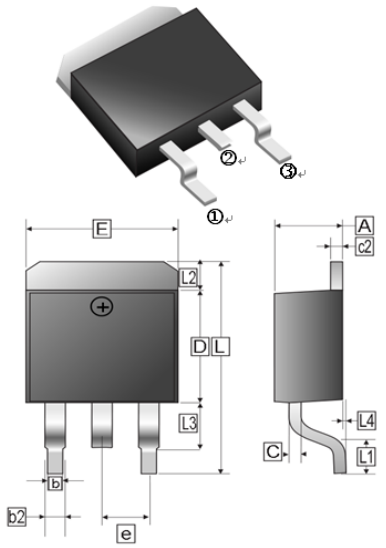
## DESCRIPTION

The SSU50N10 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 .

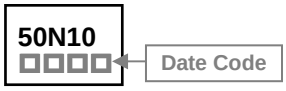
## FEATURES

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS and 100% Rg Guaranteed
- Green Device Available

**TO-263**

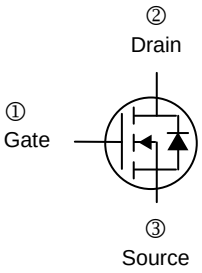



## MARKING




## PACKAGE INFORMATION

| Package | MPQ | Leader Size |
|---|---|---|
| TO-263 | 0.8K | 13 inch |




| REF. | Millimeter | | REF. | Millimeter | |
|---|---|---|---|---|---|
| | Min. | Max. | | Min. | Max. |
| A | 4.40 | 4.80 | c2 | 1.17 | 1.45 |
| b | 0.76 | 1.00 | b2 | 1.1 | 1.47 |
| L4 | 0.00 | 0.30 | D | 8.5 | 9.0 |
| c | 0.36 | 0.5 | e | 2.54 REF | |
| L3 | 1.50 REF | | L | 14.6 | 15.8 |
| L1 | 2.29 | 2.79 | θ | 0° | 8° |
| E | 9.80 | 10.4 | L2 | 1.27 REF | |

## ABSOLUTE MAXIMUM RATINGS ($T_A$=25℃ unless otherwise specified)

| Parameter | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 100 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current [1] | $V_{GS}$=10V, $T_C$=25℃ | $I_D$ | 54 | A |
| | $V_{GS}$=10V, $T_C$=100℃ | | 38 | A |
| Pulsed Drain Current [2] | | $I_{DM}$ | 160 | A |
| Total Power Dissipation [4] | $T_C$=25℃ | $P_D$ | 104 | W |
| | $T_A$=25℃ | | 3.13 | |
| Single Pulse Avalanche Energy [3] | | $E_{AS}$ | 98 | mJ |
| Single Pulse Avalanche Current | | $I_{AS}$ | 41 | A |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55~150 | ℃ |
| **Thermal Resistance Rating** | | | | |
| Maximum Thermal Resistance Junction-Ambient (PCB mount) [1] | | $R_{θJA}$ | 40 | ℃ / W |
| Maximum Thermal Resistance Junction-Case [1] | | $R_{θJC}$ | 1.2 | ℃ / W |

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

| Parameter | | Symbol | Min. | Typ. | Max. | Unit | Teat Conditions |
|---|---|---|---|---|---|---|---|
| **Static** | | | | | | | |
| Drain-Source Breakdown Voltage | | $BV_{DSS}$ | 100 | - | - | V | $V_{GS}$=0, $I_D$=250μA |
| Gate-Threshold Voltage | | $V_{GS(th)}$ | 2.5 | - | 4.5 | V | $V_{DS}$=$V_{GS}$, $I_D$=250μA |
| Forward Transconductance | | $g_{fs}$ | - | 27 | - | S | $V_{DS}$=5V, $I_D$=30A |
| Gate-Source Leakage Current | | $I_{GSS}$ | - | - | ±100 | nA | $V_{GS}$= ±20V |
| Drain-Source Leakage Current | $T_J$ =25℃ | $I_{DSS}$ | - | - | 1 | μA | $V_{DS}$=80V, $V_{GS}$=0 |
| | $T_J$ =55℃ | | - | - | 5 | | |
| Static Drain-Source On-Resistance [2] | | $R_{DS(ON)}$ | - | 18 | 22 | mΩ | $V_{GS}$=10V, $I_D$=30A |
| | | | - | 36 | 40 | | $V_{GS}$=7V, $I_D$=15A |
| Gate Resistance | | $R_g$ | - | 1.9 | 3.8 | Ω | $V_{DS}$=0, $V_{GS}$=0, f =1.0MHz |
| Total Gate Charge | | $Q_g$ | - | 27.6 | 38.6 | nC | $I_D$=30A<br>$V_{DS}$=80V<br>$V_{GS}$=10V |
| Gate-Source Charge | | $Q_{gs}$ | - | 11.4 | 16 | | |
| Gate-Drain (“Miller”) Change | | $Q_{gd}$ | - | 7.9 | 11.1 | | |
| Turn-on Delay Time | | $T_{d(on)}$ | - | 15.6 | 31.2 | nS | $V_{DS}$=50 V<br>$I_D$=30A<br>$V_{GS}$=10V<br>$R_G$=3.3 Ω |
| Rise Time | | $T_r$ | - | 17.2 | 31 | | |
| Turn-off Delay Time | | $T_{d(off)}$ | - | 16.8 | 33.6 | | |
| Fall Time | | $T_f$ | - | 9.2 | 18.4 | | |
| Input Capacitance | | $C_{iss}$ | - | 1890 | 2645 | pF | $V_{GS}$ =0<br>$V_{DS}$=15 V<br>f =1.0MHz |
| Output Capacitance | | $C_{oss}$ | - | 268 | 375 | | |
| Reverse Transfer Capacitance | | $C_{rss}$ | - | 67 | 94 | | |
| **Guaranteed Avalanche Characteristics** | | | | | | | |
| Single Pulse Avalanche Energy [5] | | EAS | 53 | - | - | mJ | $V_{DD}$=25V,L=0.1mH , $I_{AS}$=30A |
| **Source-Drain Diode** | | | | | | | |
| Diode Forward Voltage [2] | | $V_{SD}$ | - | - | 1.2 | V | $I_S$=1A, $V_{GS}$=0 |
| Continuous Source Current [1,6] | | $I_S$ | - | - | 40 | A | $V_D$=$V_G$=0, Force Current |
| Reverse Recovery Time | | $T_{rr}$ | - | 34 | - | ns | $I_F$=30A, $T_J$ = 25℃<br>dI/dt=100A/μs |
| Reverse Recovery Charge | | $Q_{rr}$ | - | 47 | - | nC | |

Notes:

1. The data tested by surface mounted on a 1 $inch_2$ FR-4 board with 2OZ copper.
2. The data tested by pulsed , pulse width≦300μs , duty cycle≦2%
3. The EAS data shows Max. rating . The test condition is $V_{DD}$=25V,$V_{GS}$=10V,L=0.1mH,$I_{AS}$=41A
4. The power dissipation is limited by 150℃ junct ion temperature
5. The Min. value is 100% EAS tested guarantee.
6. The data is theoretically the same as $I_D$ and $I_{DM}$ , in real applications , should be limited by total power dissipation.

## CHARACTERISTIC CURVES

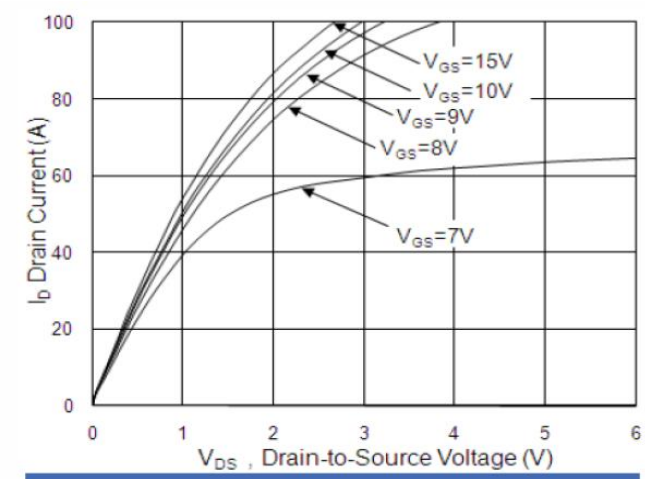



**Fig.1 Typical Output Characteristics**

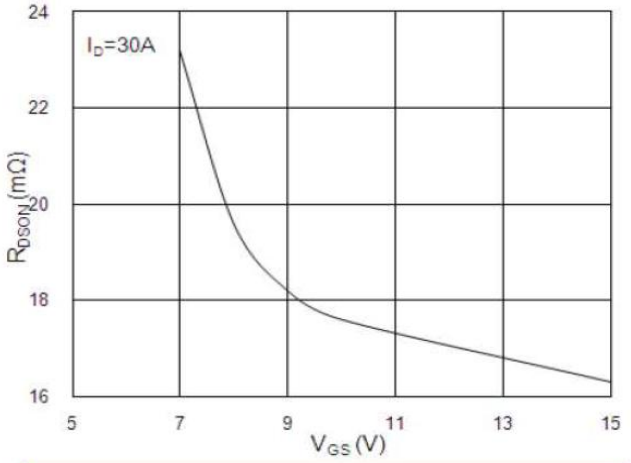



**Fig.2 On-Resistance v.s Gate-Source**

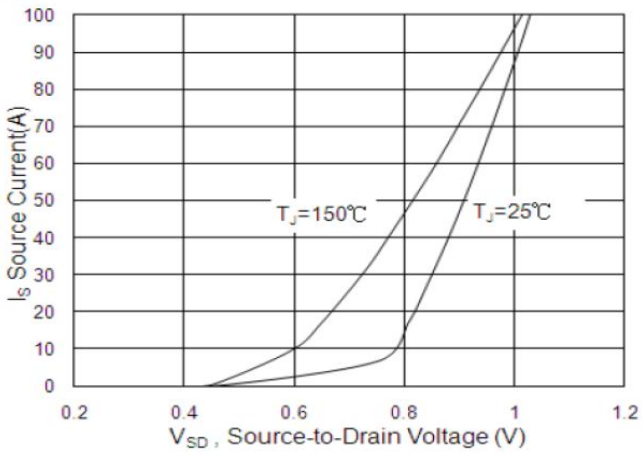



**Fig.3 Forward Characteristics of Reverse**

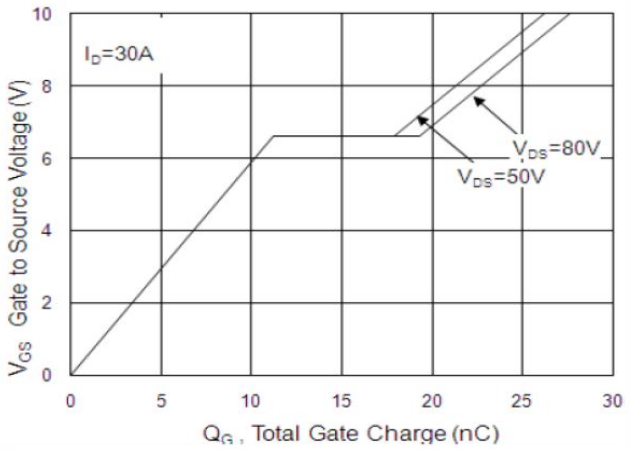



**Fig.4 Gate-Charge Characteristics**

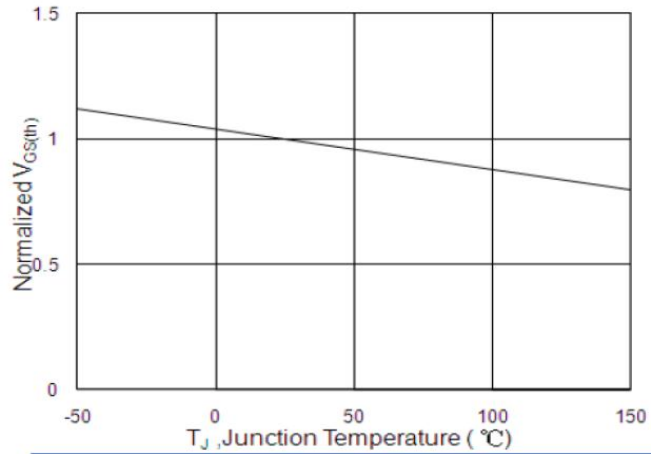



**Fig.5 Normalized $V_{GS(th)}$ v.s $T_J$**

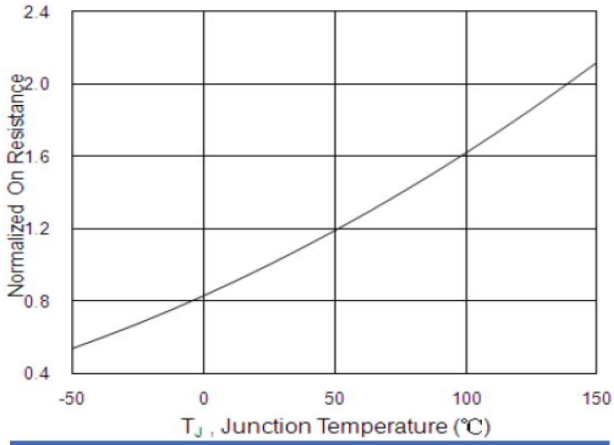



**Fig.6 Normalized $R_{DSON}$ v.s $T_J$**

## CHARACTERISTIC CURVES

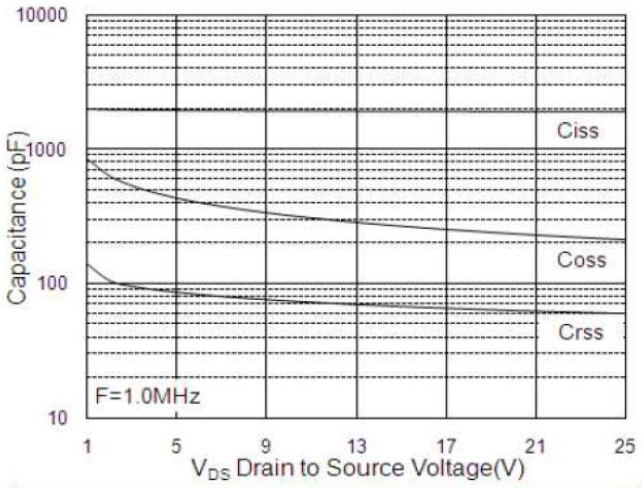



Fig.7 Capacitance

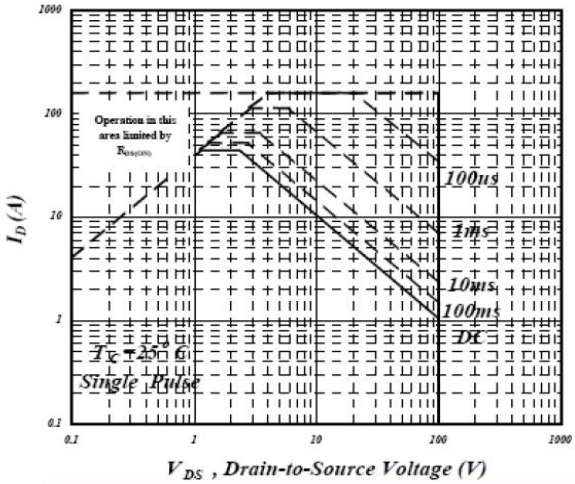



Fig.8 Safe Operating Area

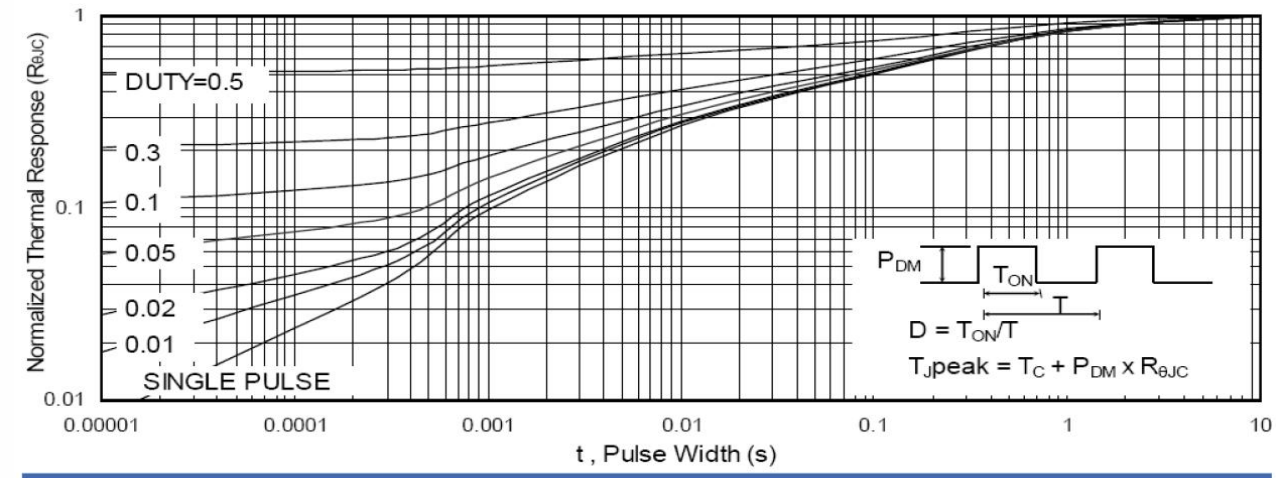



Fig.9 Normalized Maximum Transient Thermal Impedance

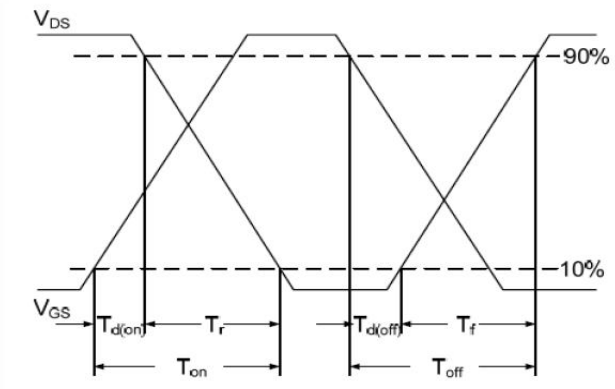



Fig.10 Switching Time Waveform

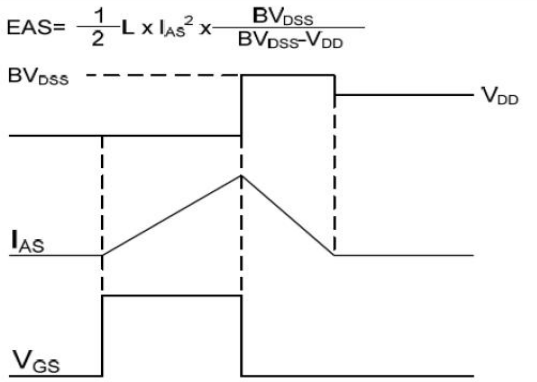



Fig.11 Unclamped Inductive Switching Wave