Elektronische Bauelemente

# SPR140N45SG

**140A, 45V, $R_{DS(ON)}$ 2.9mΩ**

**N-Ch Enhancement Mode Power MOSFET**

RoHS Compliant Product

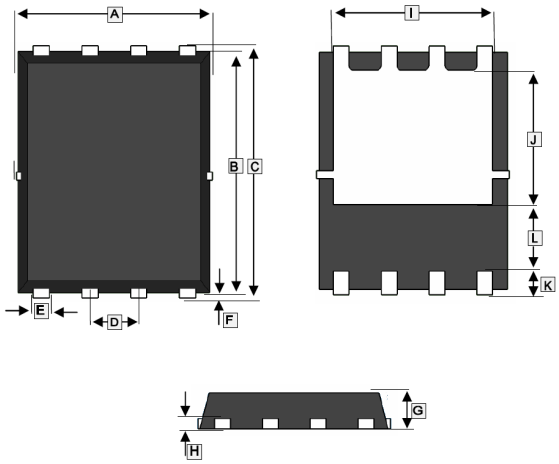
A suffix of "-C" specifies halogen free

## DESCRIPTION

The SPR140N45SG 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 SPR140N45SG meet the RoHS and Green Product with Function reliability approved.

**PR-8PP**

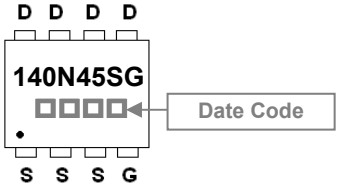


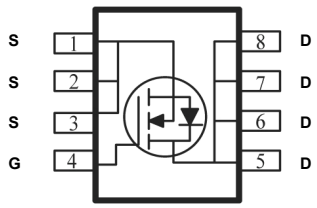

| REF. | Millimeter | | REF. | Millimeter | |
|---|---|---|---|---|---|
| | Min. | Max. | | Min. | Max. |
| A | 4.9 | 5.1 | G | 0.8 | 1.0 |
| B | 5.7 | 5.9 | H | 0.254 Ref. | |
| C | 5.95 | 6.2 | I | 4.0 Ref. | |
| D | 1.27 BSC. | | J | 3.4 Ref. | |
| E | 0.35 | 0.49 | K | 0.6 Ref. | |
| F | 0.1 | 0.2 | L | 1.4 Ref. | |

## FEATURES

- $R_{DS(on)} \leqq 2.9m\Omega$ @$V_{GS}$=10V
- $R_{DS(on)} \leqq 4m\Omega$ @$V_{GS}$=4.5V
- High speed power switching, Logic Level
- Enhanced Body diode dv/dt capability
- Enhanced Avalanche Ruggedness
- 100% UIS Tested, 100% Rg Tested
- PR-8PP Package

## MARKING




## PACKAGE INFORMATION

| Package | MPQ | Leader Size |
|---|---|---|
| PR-8PP | 3K | 13 inch |

## ABSOLUTE MAXIMUM RATINGS ($T_J$=25°C unless otherwise specified)

| Parameter | | Symbol | Ratings | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 45 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current (Silicon Limited) | $T_C$=25°C | $I_D$ | 140 | A |
| | $T_C$=100°C | | 89 | |
| Continuous Drain Current (Package Limited) | $T_C$=25°C | | 60 | |
| Pulsed Drain Current | | $I_{DM}$ | 350 | A |
| Avalanche Energy, Single Pulse, @L=0.5mH | $T_C$=25°C | $E_{AS}$ | 100 | mJ |
| Power Dissipation | $T_C$=25°C | $P_D$ | 104 | W |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 ~ 150 | °C |
| **Thermal Resistance Ratings** | | | | |
| Maximum Thermal Resistance Junction-Ambient | | $R_{\theta JA}$ | 50 | °C / W |
| Maximum Thermal Resistance Junction-Case | | $R_{\theta JC}$ | 1.2 | |

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

| Parameter | | Symbol | Min. | Typ. | Max. | Unit | Test conditions |
|---|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | | $BV_{DSS}$ | 45 | - | - | V | $V_{GS}$=0, $I_D$=250μA |
| Gate Threshold Voltage | | $V_{GS(th)}$ | 1 | 1.4 | 2.2 | V | $V_{DS}$=$V_{GS}$, $I_D$=250μA |
| Forward Transfer conductance | | $g_{fs}$ | - | 65 | - | S | $V_{DS}$=5V, $I_D$=20A |
| Gate-Source Leakage Current | | $I_{GSS}$ | - | - | ±100 | nA | $V_{GS}$=±20V |
| Drain-Source Leakage Current | $T_J$=25°C | $I_{DSS}$ | - | - | 1 | μA | $V_{DS}$=45V, $V_{GS}$=0 |
| | $T_J$=100°C | | - | - | 100 | | |
| Static Drain-Source On-Resistance | | $R_{DS(ON)}$ | - | 2.5 | 2.9 | mΩ | $V_{GS}$=10V, $I_D$=20A |
| | | | - | 3.2 | 4 | mΩ | $V_{GS}$=4.5V, $I_D$=20A |
| Total Gate Charge | | $Q_g$ | - | 50 | - | nC | $V_{GS}$=10V |
| Total Gate Charge | | $Q_g$ | - | 25 | - | | $V_{GS}$=4.5V |
| Gate-Source Charge | | $Q_{gs}$ | - | 8 | - | | $I_D$=20A<br>$V_{DD}$=20V<br>$V_{GS}$=10V |
| Gate-Drain (“Miller”) Change | | $Q_{gd}$ | - | 9.5 | - | | |
| Turn-on Delay Time | | $T_{d(on)}$ | - | 14 | - | nS | $V_{DD}$=20V<br>$I_D$=20A<br>$V_{GS}$=10V<br>$R_G$=10Ω |
| Rise Time | | $T_r$ | - | 12 | - | | |
| Turn-off Delay Time | | $T_{d(off)}$ | - | 57 | - | | |
| Fall Time | | $T_f$ | - | 18 | - | | |
| Input Capacitance | | $C_{iss}$ | - | 3322 | - | pF | $V_{GS}$=0<br>$V_{DS}$=20V<br>f=1.0MHz |
| Output Capacitance | | $C_{oss}$ | - | 1367 | - | | |
| Reverse Transfer Capacitance | | $C_{rss}$ | - | 96 | - | | |
| **Source-Drain Diode** | | | | | | | |
| Forward On Voltage | | $V_{SD}$ | - | 0.9 | 1.2 | V | $I_F$=20A, $V_{GS}$=0 |
| Reverse Recovery Time | | $T_{rr}$ | - | 40 | - | nS | $V_R$=20V, $I_F$=20A, dI/dt=200A/μs |
| Reverse Recovery Charge | | $Q_{rr}$ | - | 64 | - | nC | |

## TYPICAL CHARACTERISTICS CURVE

Fig 1. Typical Output Characteristics

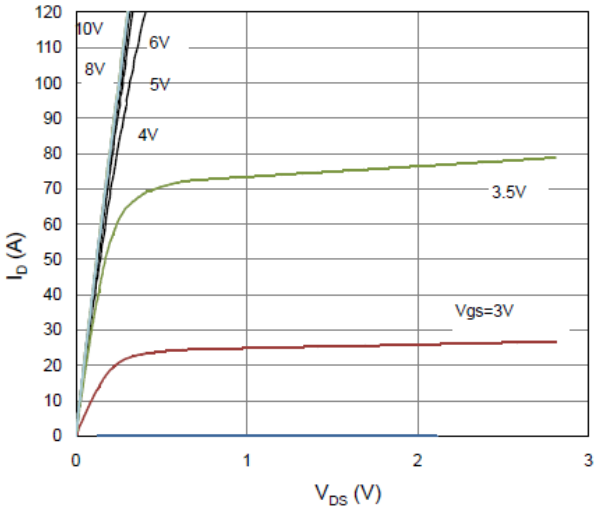



Figure 2. On-Resistance vs. Gate-Source Voltage

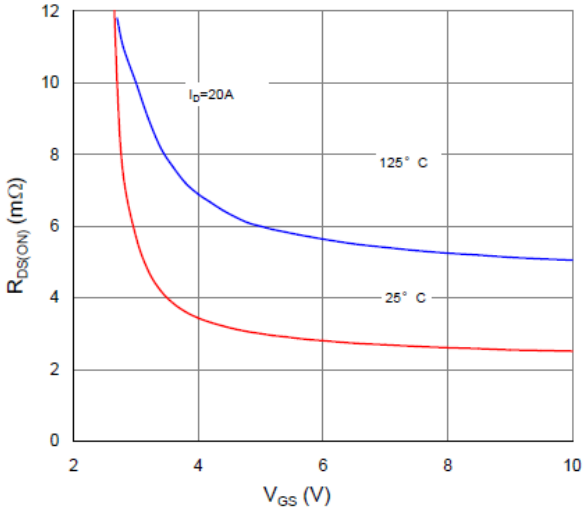



Figure 3. On-Resistance vs. Drain Current and Gate Voltage

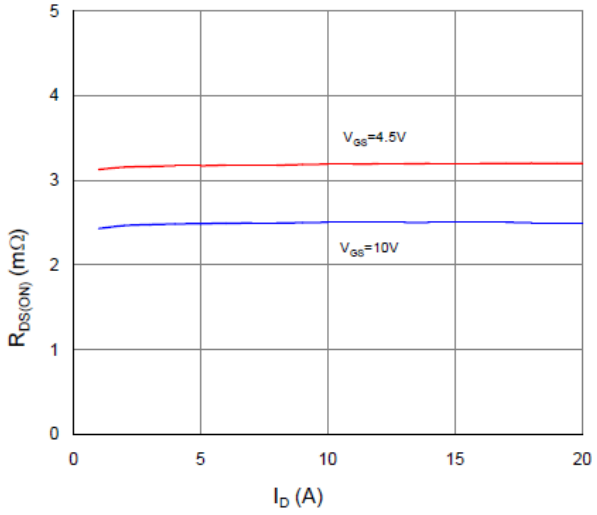



Figure 4. Normalized On-Resistance vs. Junction Temperature

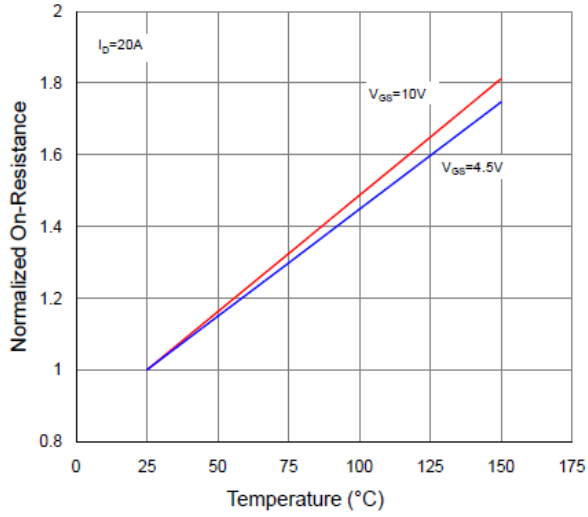



Figure 5. Typical Transfer Characteristics

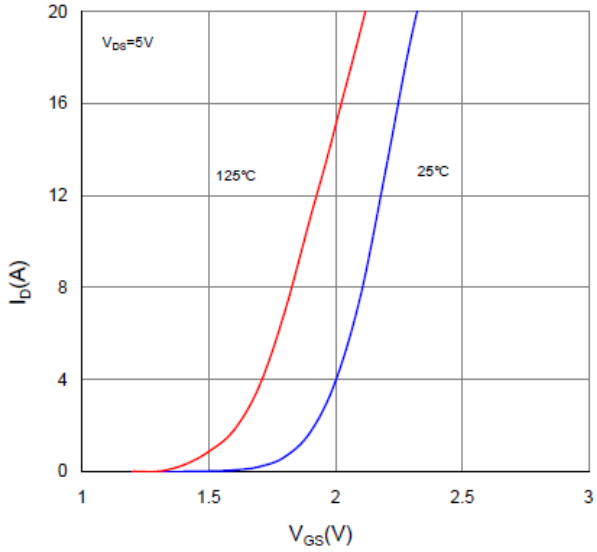
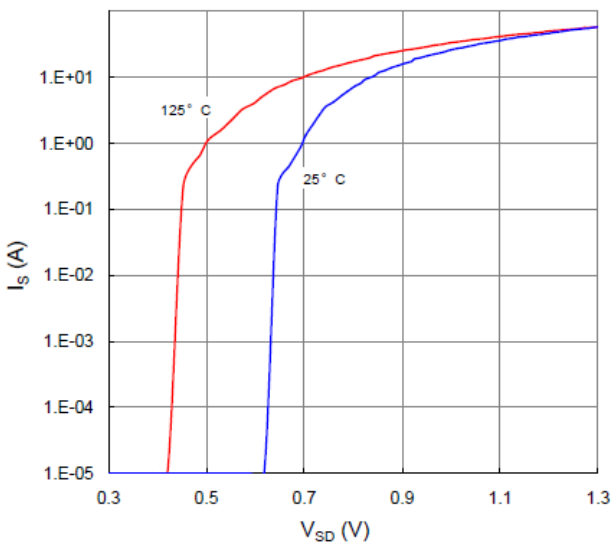



Figure 6. Typical Source-Drain Diode Forward Voltage



## TYPICAL CHARACTERISTICS CURVE

Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

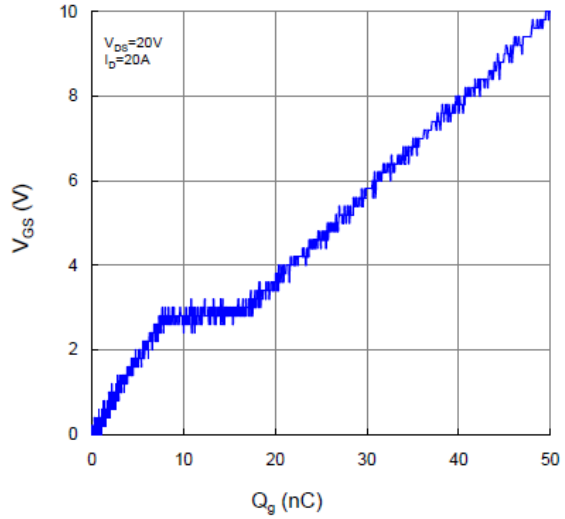



Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

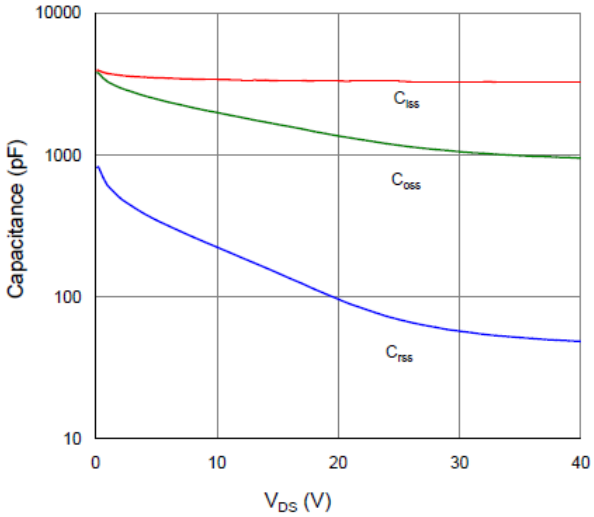



Figure 9. Maximum Safe Operating Area

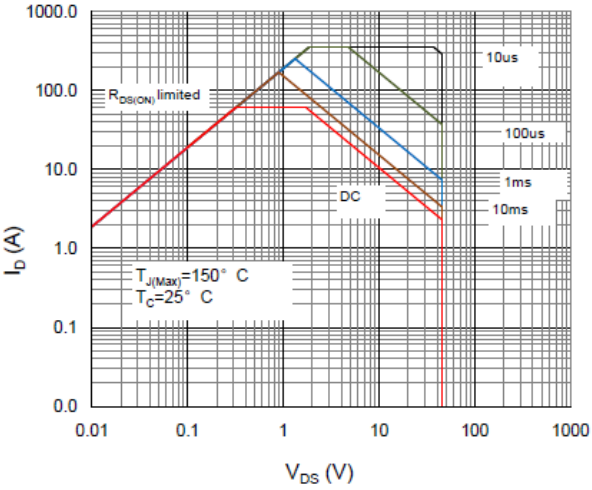



Figure 10. Maximun Drain Current vs. Case Temperature

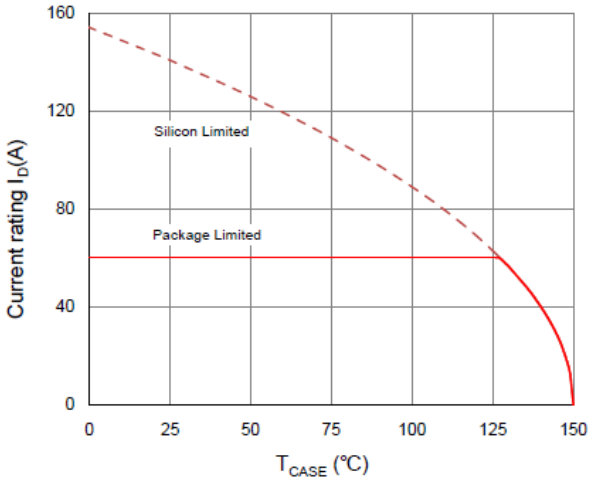



Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Ambient