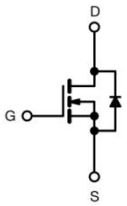
# N-channel Power MOSFET

| PRODUCT SUMMARY | | |
|---|---|---|
| $V_{DS}$ (V) at $T_J$ max. | 700 | |
| $R_{DS(on)}$ max. at 25°C (Ω) | $V_{GS}$=10V | 0.9 |
| $Q_g$ max. (nC) | 58 | |
| $Q_{gs}$ (nC) | 9 | |
| $Q_{gd}$ (nC) | 22 | |
| Configuration | single | |

## Features

- $I_D$=12A(Vgs=10V)
- Ultra Low Gate Charge
- Improved dv/dt Capability
- 100% Avalanche Tested
- RoHS compliant


TO-220F




Schematic diagram

## Applications

- Switching Mode Power Supplies (SMPS)
- PWM Motor Controls
- DC to DC Converters
- LED Lighting
- Bridge Circuits

| ORDERING INFORMATION | |
|---|---|
| Device | SPC12N65G |
| Device Package | TO-220F |
| Marking | 12N65G |

**ABSOLUTE MAXIMUM RATINGS** ($T_C$ = 25°C, unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|---|---|---|---|
| Drain to Source Voltage | $V_{DSS}$ | 650 | V |
| Continuous Drain Current (@$T_C$=25°C) | $I_D$ | 12 (1) | A |
| Continuous Drain Current (@$T_C$=100°C) | | 7.5 (1) | A |
| Drain current pulsed (2) | $I_{DM}$ | 48 (1) | A |
| Gate to Source Voltage | $V_{GS}$ | ±30 | V |
| Single pulsed Avalanche Energy (3) | $E_{AS}$ | 432 | mJ |
| Peak diode Recovery dv/dt (4) | dv/dt | 6 | V/ns |
| Total power dissipation (@$T_C$=25°C) | $P_D$ | 42 | W |
| Derating Factor above 25°C | | 0.34 | W/°C |
| Operating Junction Temperature & Storage Temperature | $T_{STG}$, $T_J$ | -55 to + 150 | °C |
| Maximum lead temperature for soldering purpose | $T_L$ | 260 | °C |
| Mounting torque (5) | | 0.4~0.6 | N.m |

Notes
1. Drain current is limited by maximum junction temperature.
2. Repetitive rating : pulse width limited by junction temperature.
3. L = 6mH, $I_{AS}$ = 12A, $V_{DD}$ = 50V, $R_G$=25Ω, Starting at $T_J$ = 25°C
4. $I_{SD}$ ≤ 12A, di/dt = 100A/us, $V_{DD}$ ≤ $BV_{DSS}$, Starting at $T_J$ =25°C
5. Mounting consideration for TO220 Fullpack:
   M3 screw plus flat washer is suggested, free of burr between devices and contact area,
   the devices are to be mounted to a hole not larger than 3.6mm in contact diameter (chamfer included).

## THERMAL CHARACTERISTICS

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Thermal resistance, Junction to case | $R_{thjc}$ | 3.0 | °C/W |
| Thermal resistance, Junction to ambient | $R_{thja}$ | 45 | °C/W |

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

| Parameter | Symbol | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain to source breakdown voltage | $BV_{DSS}$ | $V_{GS}$=0V, $I_D$=250uA | 650 | -- | -- | V |
| Breakdown voltage temperature coefficient | $\Delta BV_{DSS}$ / $\Delta TJ$ | $I_D$=250uA, referenced to 25°C | -- | 0.51 | -- | V/°C |
| Drain to source leakage current | $I_{DSS}$ | $V_{DS}$=650V, $V_{GS}$=0V | -- | -- | 1 | uA |
| | | $V_{DS}$=520V, $T_C$=125°C | -- | -- | 50 | uA |
| Gate to source leakage current, forward | $I_{GSS}$ | $V_{GS}$=30V, $V_{DS}$=0V | -- | -- | 100 | nA |
| Gate to source leakage current, reverse | | $V_{GS}$=-30V, $V_{DS}$=0V | -- | -- | -100 | nA |
| **On Characteristics** | | | | | | |
| Gate threshold voltage | $V_{GS(TH)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250uA | 2 | -- | 4 | V |
| Drain to source on state resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$ =6A | -- | 0.75 | 0.9 | Ω |
| Forward Transconductance | Gfs | $V_{DS}$ = 30 V, $I_D$ = 6A | -- | 7 | -- | S |
| **Dynamic Characteristics** | | | | | | |
| Input capacitance | $C_{iss}$ | $V_{GS}$=0V, $V_{DS}$=25V, f=1MHz | -- | 1560 | -- | pF |
| Output capacitance | $C_{oss}$ | | -- | 130 | -- | |
| Reverse transfer capacitance | $C_{rss}$ | | -- | 22 | -- | |
| Turn on delay time | $t_{d(on)}$ | $V_{DS}$=380V, $I_D$=12A , $R_G$=25Ω | -- | 15 | -- | ns |
| Rising time | tr | | -- | 45 | -- | |
| Turn off delay time | $t_{d(off)}$ | | -- | 90 | -- | |
| Fall time | $t_f$ | | -- | 30 | -- | |
| Total gate charge | $Q_g$ | $V_{DS}$=520V, $V_{GS}$=10V, $I_D$=12A | -- | 50 | -- | nC |
| Gate-source charge | $Q_{gs}$ | | -- | 9 | -- | |
| Gate-drain charge | $Q_{gd}$ | | -- | 22 | -- | |

## SOURCE TO DRAIN DIODE RATINGS CHARACTERISTICS

| Parameter | Symbol | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Continuous source current | $I_S$ | Integral reverse p-n Junction diode in the MOSFET | -- | -- | 12 | A |
| Pulsed source current | $I_{SM}$ | | -- | -- | 48 | A |
| Diode forward voltage drop. | $V_{SD}$ | $I_S$=12A, $V_{GS}$=0V | -- | -- | 1.2 | V |
| Reverse recovery time | $T_{rr}$ | $I_S$=12A, $V_{GS}$=0V, $dI_F/dt$=100A/us | -- | 600 | -- | ns |
| Reverse recovery Charge | Qrr | | -- | 28 | -- | uC |

**Fig1. Output characteristics**

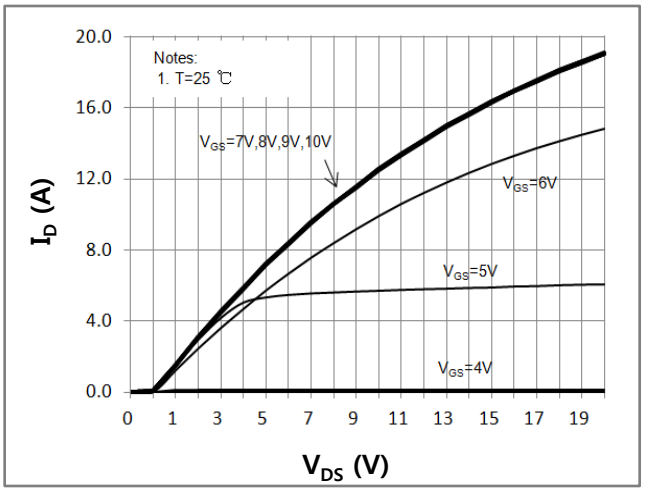



**Fig2. Drain-source on-state resistance**

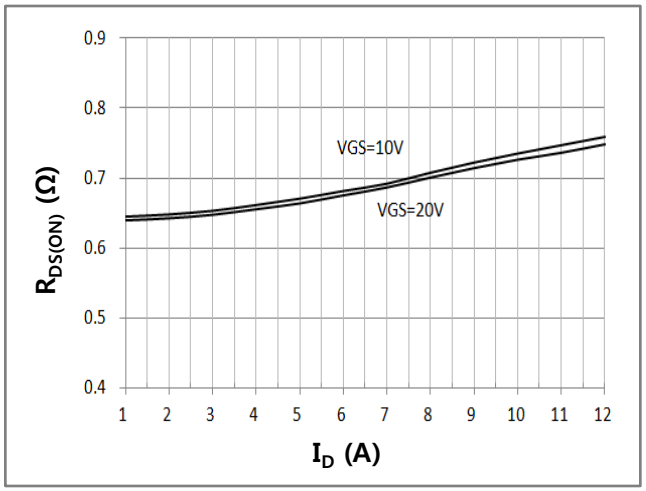



**Fig3. Gate charge characteristics**

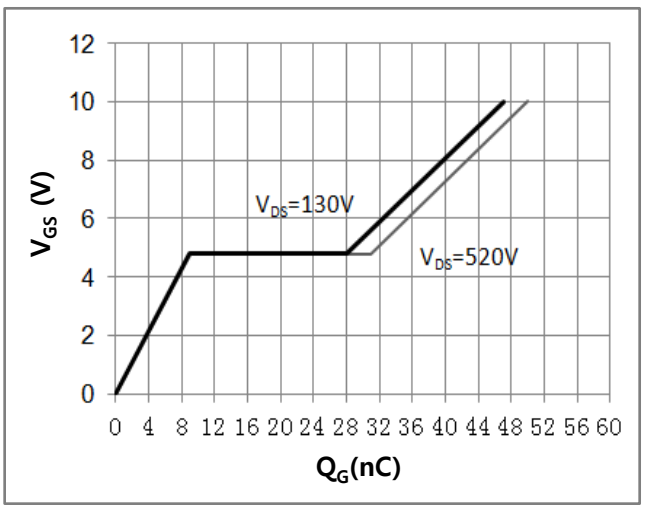



**Fig 4. Capacitance Characteristics**

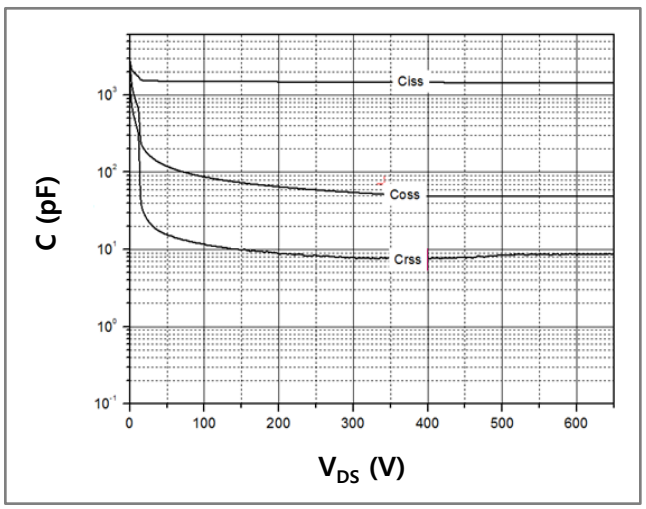



**Fig 5. $R_{DS(ON)}$ vs junction temperature**

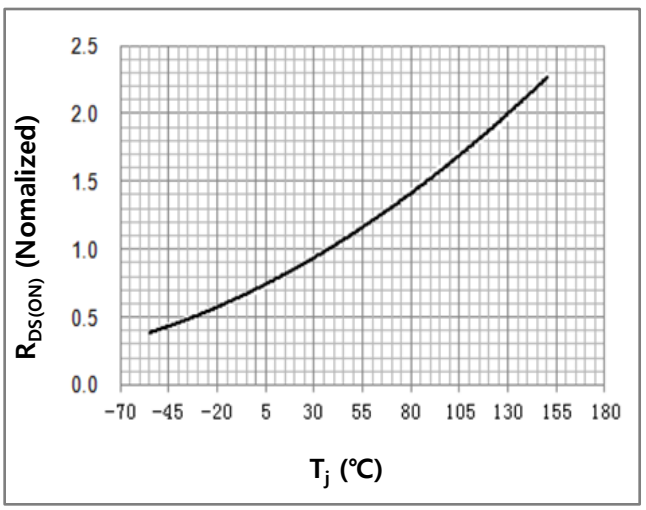



**Fig 6. $BV_{DSS}$ vs junction temperature**

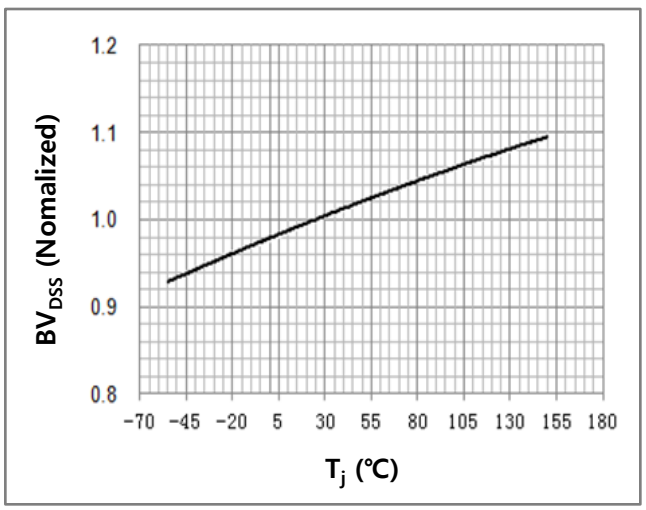


**Fig 7 . Safe operating area**

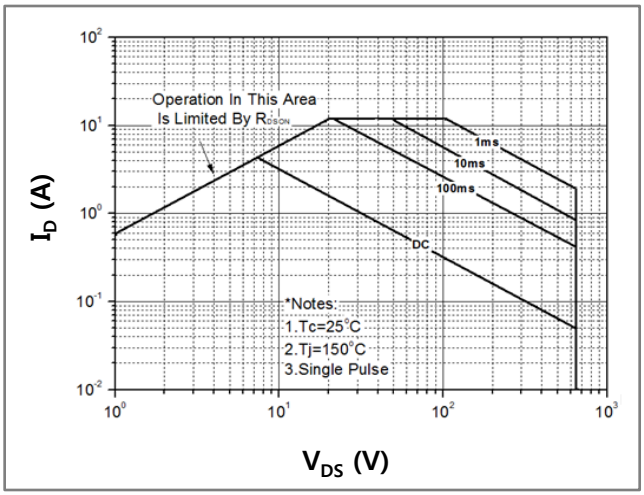



**Fig 8 . Transient thermal impedance**

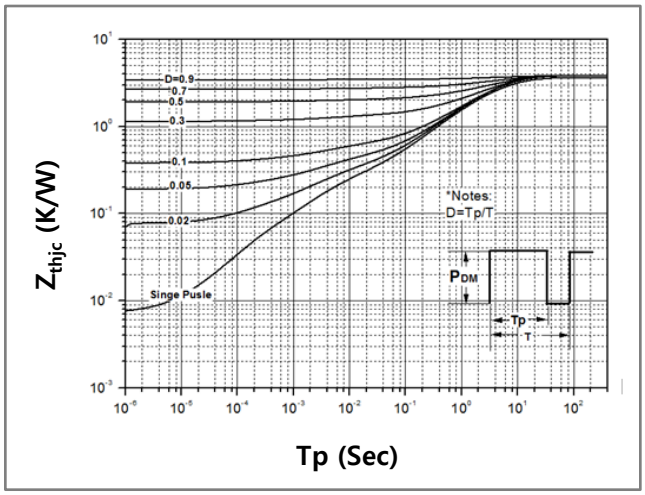



**Fig 9. Forward characteristics of reverse diode**

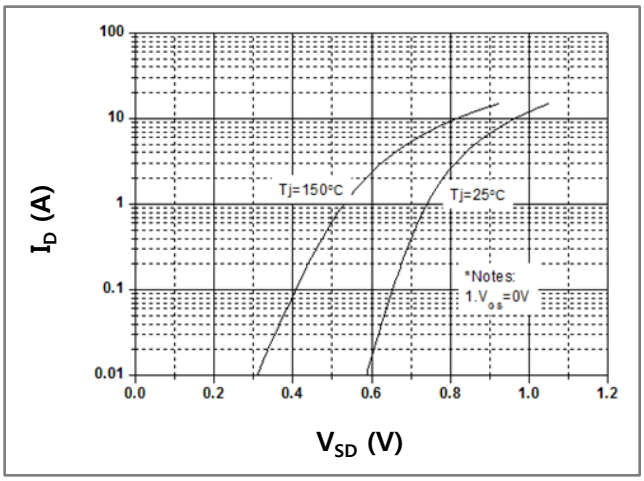
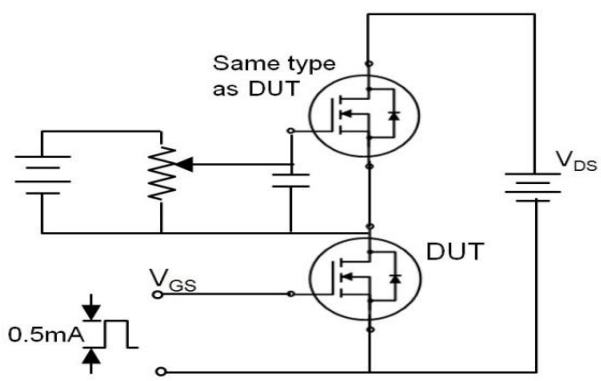



**Fig 10. Gate charge test circuit & waveform**



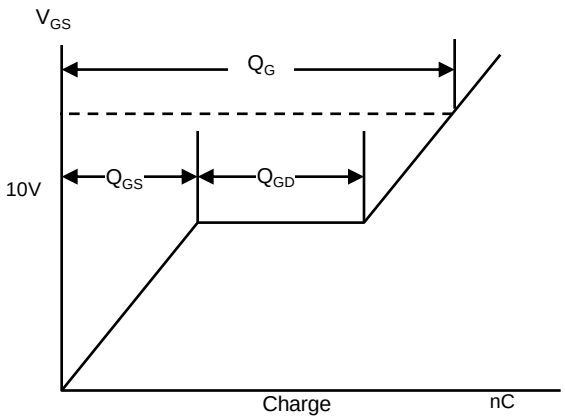



**Fig 11. Switching time test circuit & waveform**

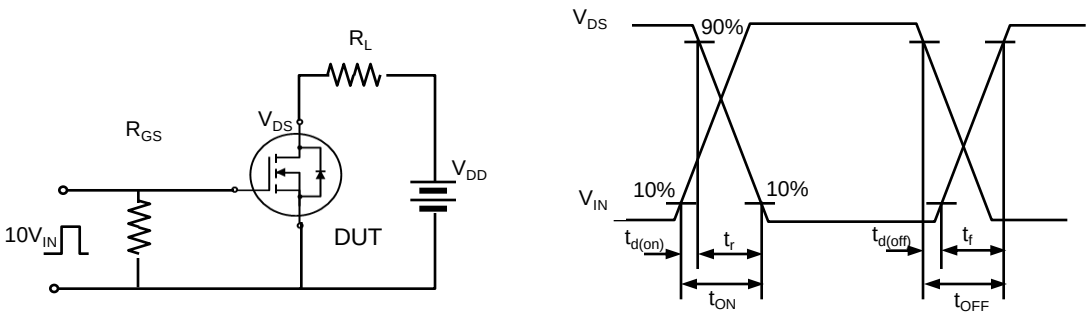



**Fig 12. Unclamped Inductive switching test circuit & waveform**

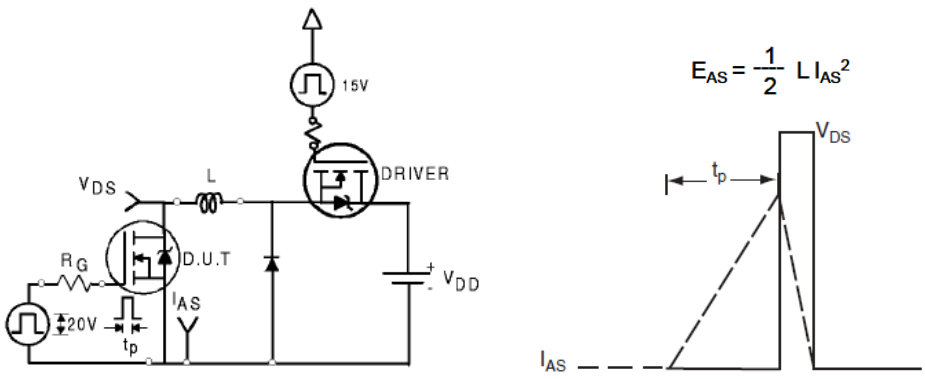
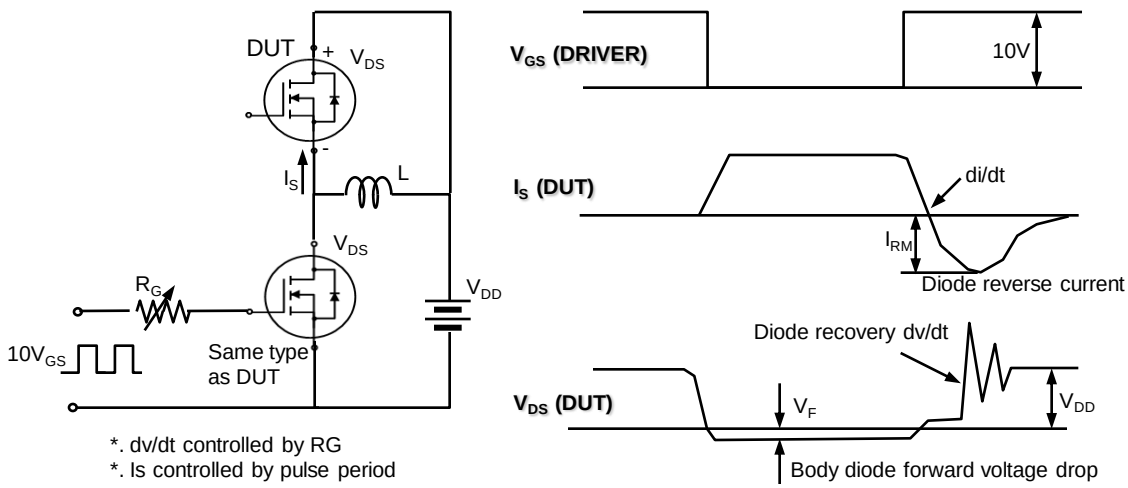



**Fig 13. Peak diode recovery dv/dt test circuit & waveform**



# Disclaimer

- SINAI assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all SINAI products described or contained herein.

- Specifications of any and all SINAI products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.

- In the event that any or all SINAI products(including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.

- This catalog provides information as of Nov. 2014. Specifications and information herein are subject to change without notice.

# X-ON Electronics

Largest Supplier of Electrical and Electronic Components

***Click to view similar products for*** MOSFET ***category:***

***Click to view products by*** Sinai Power ***manufacturer:***

Other Similar products are found below :

614233C 648584F MCH3443-TL-E MCH6422-TL-E FDPF9N50NZ FW216A-TL-2W FW231A-TL-E APT5010JVR NTNS3A92PZT5G IRF100S201 JANTX2N5237 2SK2464-TL-E 2SK3818-DL-E FCA20N60_F109 FDZ595PZ STD6600NT4G FSS804-TL-E 2SJ277-DL-E 2SK1691-DL-E 2SK2545(Q,T) D2294UK 405094E 423220D MCH6646-TL-E TPCC8103,L1Q(CM 367-8430-0972-503 VN1206L 424134F 026935X 051075F SBVS138LT1G 614234A 715780A NTNS3166NZT5G 751625C 873612G IRF7380TRHR IPS70R2K0CEAKMA1 RJK60S3DPP-E0#T2 RJK60S5DPK-M0#T0 APT5010JVFR APT12031JFLL APT12040JVR DMN3404LQ-7 NTE6400 JANTX2N6796U JANTX2N6784U JANTXV2N5416U4 SQM110N05-06L-GE3 SIHF35N60E-GE3