

NCE N-Channel Enhancement Mode Power MOSFET

DESCRIPTION

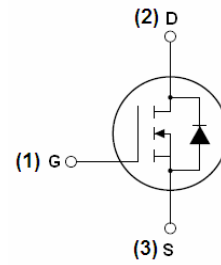
The NCE0128 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

GENERAL FEATURES

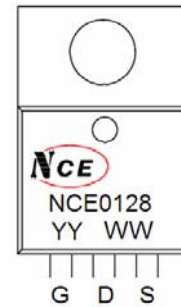
- $V_{DS} = 100V, I_D = 28A$
 $R_{DS(ON)} < 26m\Omega @ V_{GS}=10V$ (Typ: 13.3 m Ω)
- Special process technology for high ESD capability
- High density cell design for ultra low R_{dson}
- Fully characterized Avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation

Application

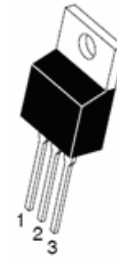
- Power switching application
- Hard Switched and High Frequency Circuits
- Uninterruptible Power Supply



Schematic diagram



Marking and pin Assignment



TO-220 top view

Package Marking And Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|----------------|---------|----------------|-----------|------------|----------|
| NCE0128 | NCE0128 | TO-220 | - | - | - |

Absolute Maximum Ratings (TA=25°C unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|--|--------------------|------------|------|
| Drain-Source Voltage | V_{DS} | 100 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Drain Current-Continuous | I_D | 28 | A |
| Drain Current-Continuous($T_C=100^\circ C$) | $I_D(100^\circ C)$ | 20 | A |
| Pulsed Drain Current | I_{DM} | 190 | A |
| Maximum Power Dissipation | P_D | 63 | W |
| Derating factor | | 0.42 | W/°C |
| Single pulse avalanche energy (Note 5) | E_{AS} | 550 | mJ |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 150 | °C |

Thermal Characteristic

| | | | |
|--|-----------------|-----|---------------|
| Thermal Resistance, Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 2.4 | $^{\circ}C/W$ |
|--|-----------------|-----|---------------|

Electrical Characteristics (TA=25 $^{\circ}C$ unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|--------------|--|-----|------|-----------|------------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 100 | | | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=100V, V_{GS}=0V$ | | | 1 | μA |
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | | | ± 100 | nA |
| On Characteristics (Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 2 | | 4 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=16A$ | | 13.3 | 26 | m Ω |
| Forward Transconductance | g_{FS} | $V_{DS}=25V, I_D=16A$ | 30 | | | S |
| Dynamic Characteristics (Note 4) | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}=25V, V_{GS}=0V,$ $F=1.0MHz$ | | 3700 | | PF |
| Output Capacitance | C_{oss} | | | 630 | | PF |
| Reverse Transfer Capacitance | C_{rss} | | | 330 | | PF |
| Switching Characteristics (Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}=50V, I_D=16A$ $V_{GS}=10V, R_{GEN}=2.5\Omega$ | | 12 | | nS |
| Turn-on Rise Time | t_r | | | 55 | | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 45 | | nS |
| Turn-Off Fall Time | t_f | | | 47 | | nS |
| Total Gate Charge | Q_g | $V_{DS}=80V, I_D=16A,$ $V_{GS}=10V$ | | 95 | | nC |
| Gate-Source Charge | Q_{gs} | | | 18 | | nC |
| Gate-Drain Charge | Q_{gd} | | | 25 | | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage (Note 3) | V_{SD} | $V_{GS}=0V, I_S=16A$ | | 0.85 | 1.2 | V |
| Diode Forward Current (Note 2) | I_S | | | | 57 | A |
| Reverse Recovery Time | t_{rr} | $T_J = 25^{\circ}C, I_F = 16A$ $di/dt = 100A/\mu s$ (Note3) | | 140 | 220 | nS |
| Reverse Recovery Charge | Q_{rr} | | | 650 | 1000 | nC |
| Forward Turn-On Time | t_{on} | Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD) | | | | |

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. EAS condition: $T_J=25^{\circ}C, V_{DD}=50V, V_G=10V, L=0.5mH, R_g=25\Omega$

Test circuit

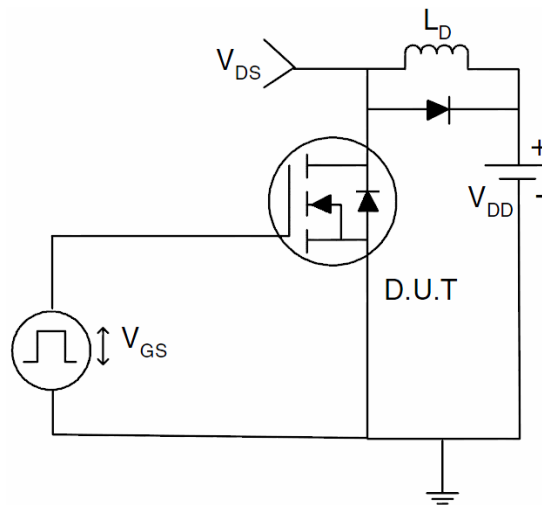
1) E_{AS} test Circuits



2) Gate charge test Circuit:



3) Switch Time Test Circuit:



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

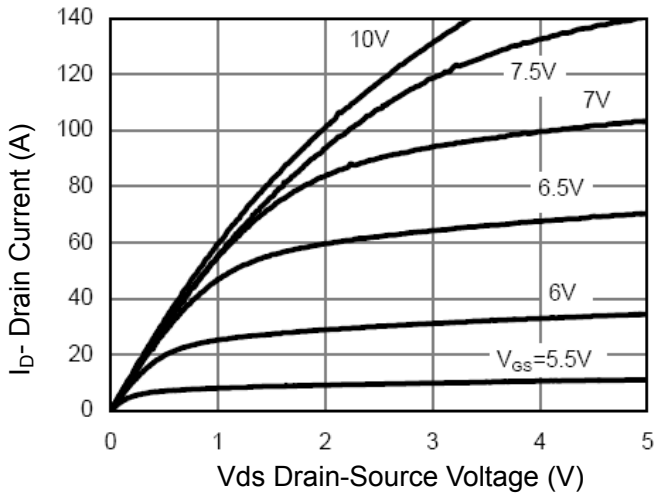


Figure 1 Output Characteristics

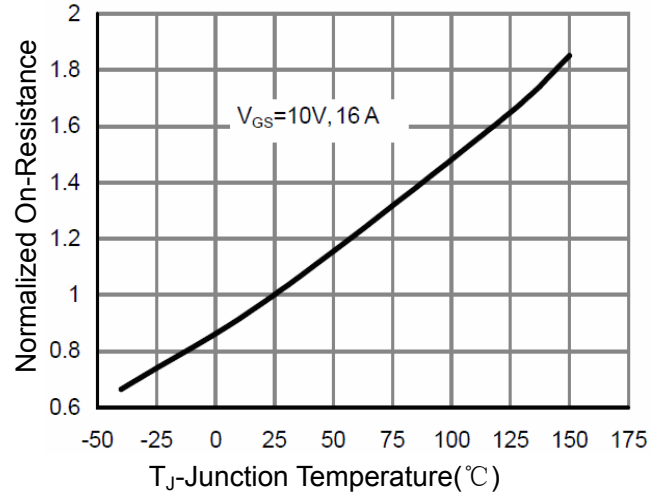


Figure 4 Rdson-Junction Temperature

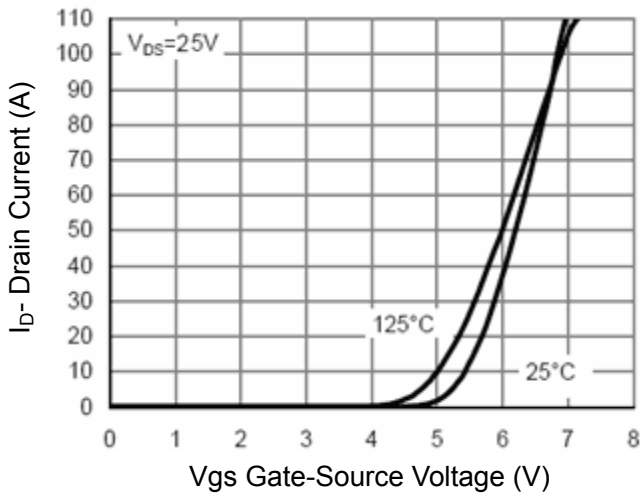


Figure 2 Transfer Characteristics

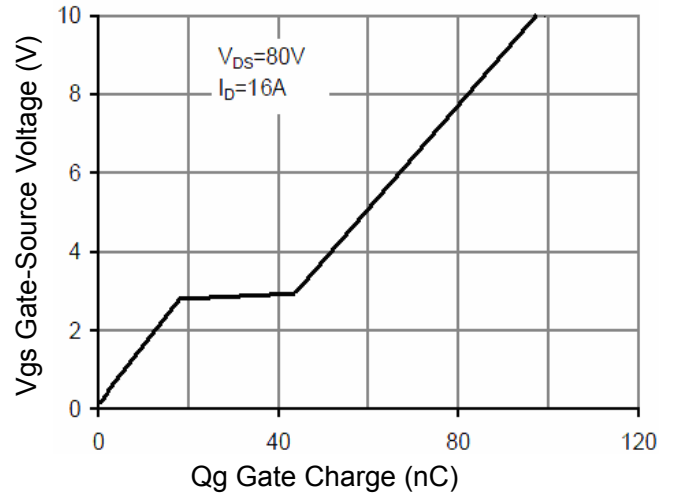


Figure 5 Gate Charge

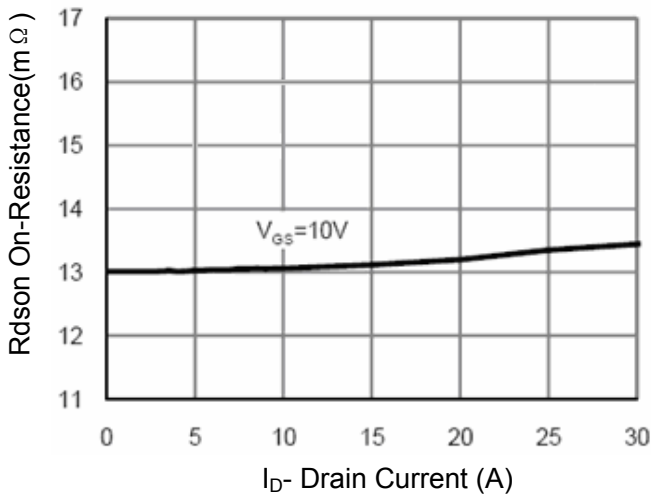


Figure 3 Rdson- Drain Current

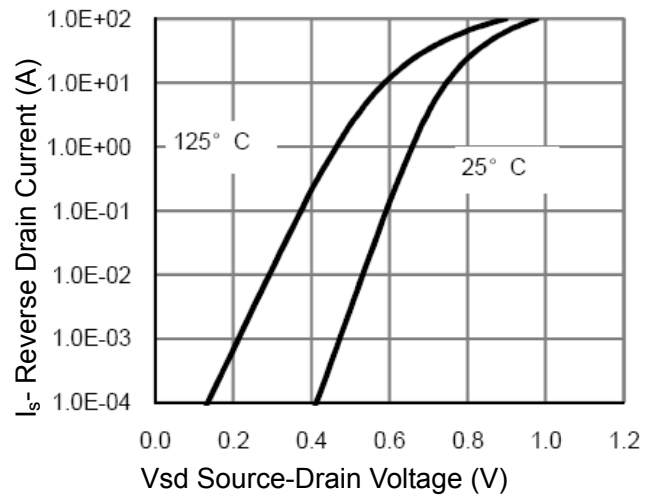


Figure 6 Source- Drain Diode Forward

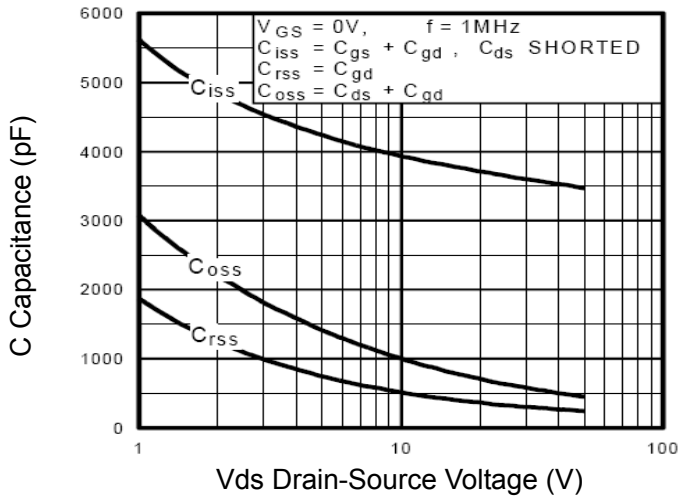


Figure 7 Capacitance vs Vds

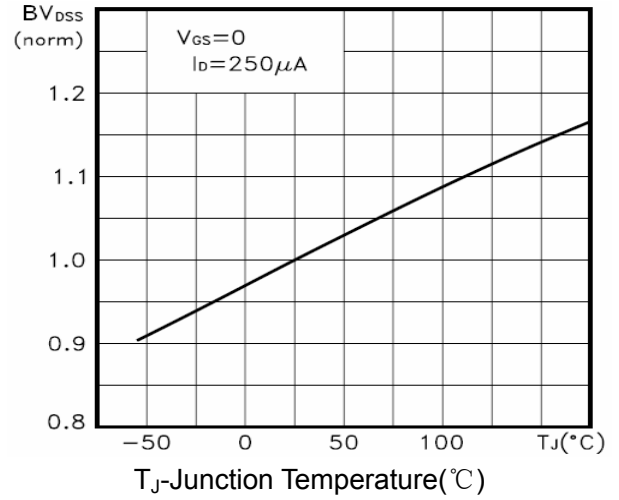


Figure 9 BV_{DSS} vs Junction Temperature

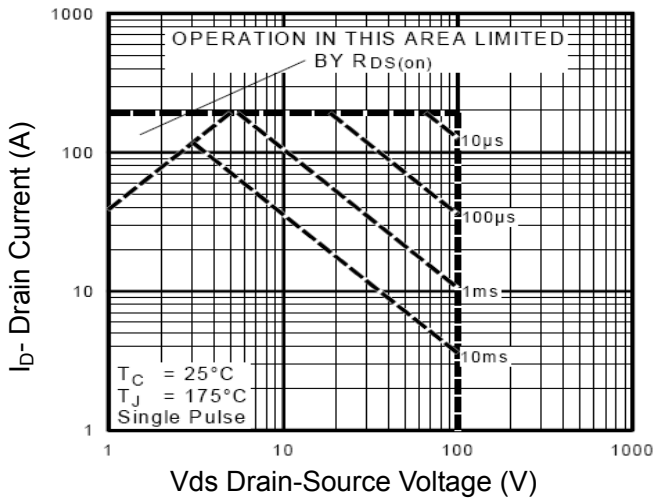


Figure 8 Safe Operation Area

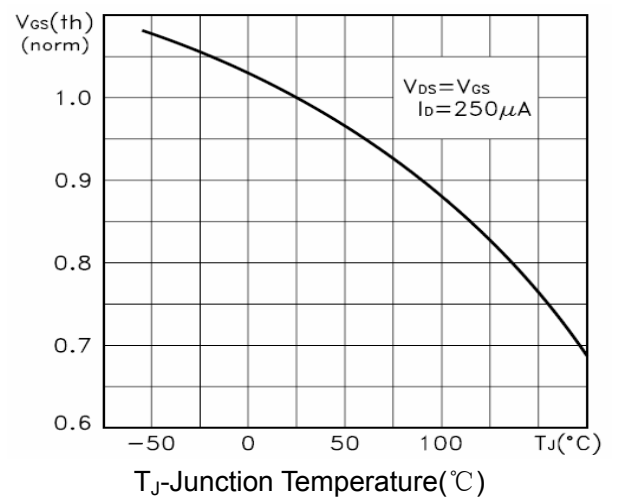


Figure 10 $V_{GS(th)}$ vs Junction Temperature

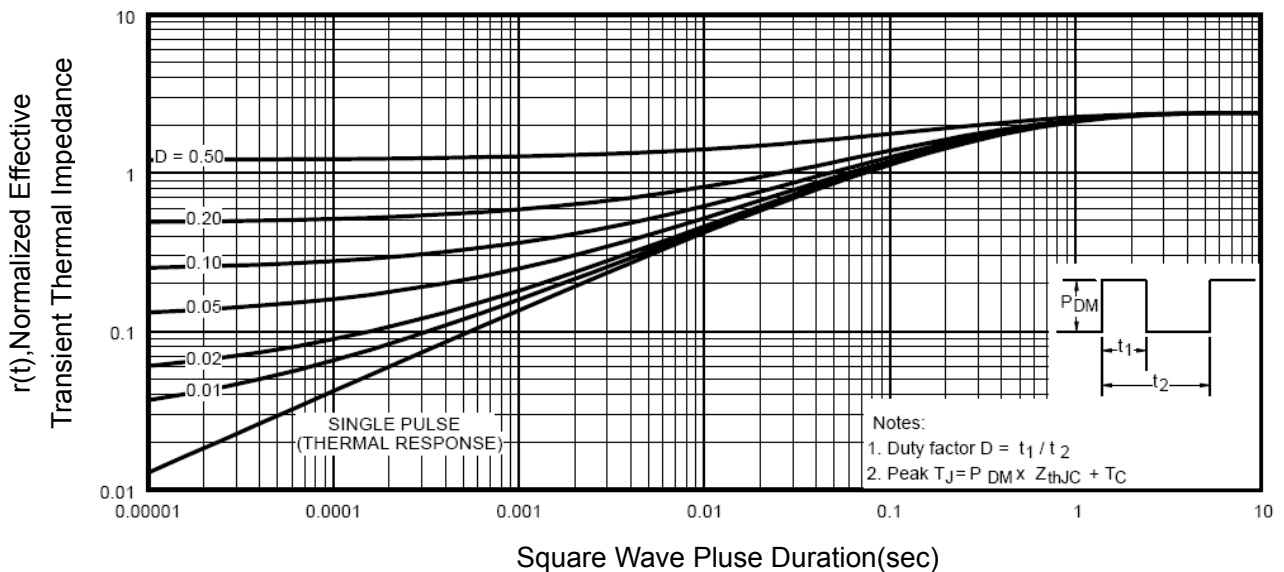
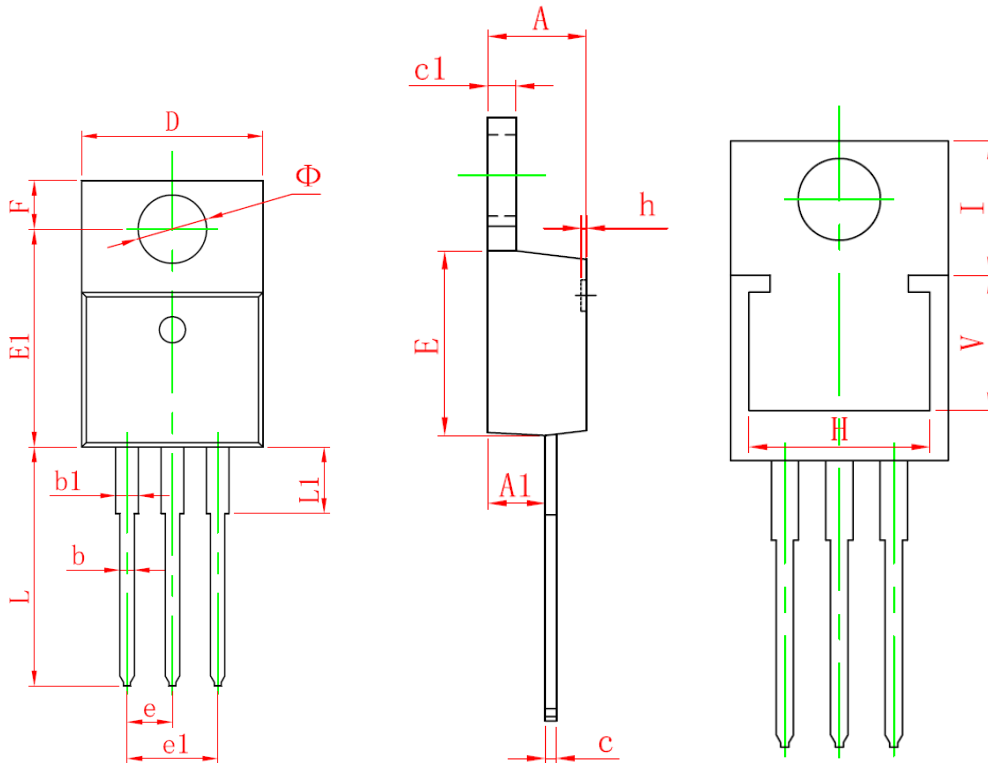


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-220-3L Package Information



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|--------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 4.470 | 4.670 | 0.176 | 0.184 |
| A1 | 2.520 | 2.820 | 0.099 | 0.111 |
| b | 0.710 | 0.910 | 0.028 | 0.036 |
| b1 | 1.170 | 1.370 | 0.046 | 0.054 |
| c | 0.330 | 0.650 | 0.013 | 0.026 |
| c1 | 1.200 | 1.400 | 0.047 | 0.055 |
| D | 10.010 | 10.350 | 0.394 | 0.407 |
| E | 8.500 | 8.900 | 0.335 | 0.350 |
| E1 | 12.060 | 12.460 | 0.475 | 0.491 |
| e | 2.540 (TYP.) | | 0.100 (TYP.) | |
| e1 | 4.980 | 5.180 | 0.196 | 0.204 |
| F | 2.590 | 2.890 | 0.102 | 0.114 |
| H | 8.440 REF. | | 0.332 REF. | |
| h | 0.000 | 0.300 | 0.000 | 0.012 |
| L | 13.400 | 13.800 | 0.528 | 0.543 |
| L1 | 3.560 | 3.960 | 0.140 | 0.156 |
| V | 6.360 REF. | | 0.250 REF. | |
| I | 6.300 REF. | | 0.248 REF. | |
| Φ | 3.735 | 3.935 | 0.147 | 0.155 |

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