

NCE2090K-VB Datasheet

N-Channel 20-V (D-S)175 °C MOSFET

PRODUCT SUMMARY

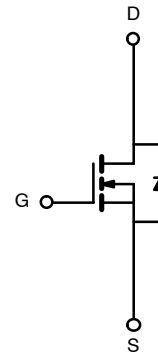
| V_{DS} (V) | $r_{DS(on)}$ (Ω) | I_D (A) ^a |
|--------------|---------------------------|------------------------|
| 20 | 0.0045 @ $V_{GS} = 4.5$ V | 100 |
| | 0.006 @ $V_{GS} = 2.5$ V | 90 |

FEATURES

- Trench Power MOSFET
- 175°C Maximum Junction Temperature
- 100% R_g Tested



Drain Connected to Tab



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

| Parameter | Symbol | Limit | Unit |
|---|----------------|---|------------------|
| Drain-Source Voltage | V_{DS} | 20 | V |
| Gate-Source Voltage | V_{GS} | ± 15 | |
| Continuous Drain Current ^a | I_D | $T_C = 25^\circ\text{C}$ 100 | A |
| | | $T_C = 100^\circ\text{C}$ 80 | |
| Pulsed Drain Current | I_{DM} | 200 | |
| Continuous Source Current (Diode Conduction) ^a | I_S | 65 | |
| Maximum Power Dissipation | P_D | $T_C = 25^\circ\text{C}$ 71 | W |
| | | $T_A = 25^\circ\text{C}$ 8.3 ^{b, c} | |
| Operating Junction and Storage Temperature Range | T_J, T_{stg} | -55 to 175 | $^\circ\text{C}$ |

THERMAL RESISTANCE RATINGS

| Parameter | Symbol | Typical | Maximum | Unit |
|--|------------|------------------------|---------|--------------------|
| Maximum Junction-to-Ambient ^b | R_{thJA} | $t \leq 10$ sec. 15 | 18 | $^\circ\text{C/W}$ |
| | | Steady State 40 | 50 | |
| Maximum Junction-to-Case | R_{thJC} | 1.75 | 2.1 | |

Notes

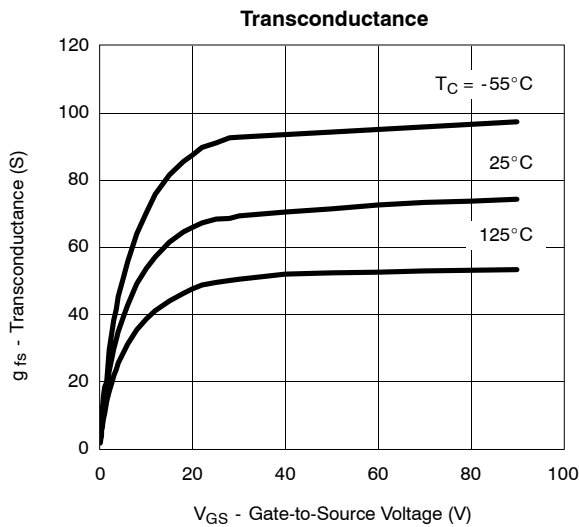
- a. Package Limited
b. Surface Mounted on 1" x 1" FR4 Board
c. $t \leq 10$ sec

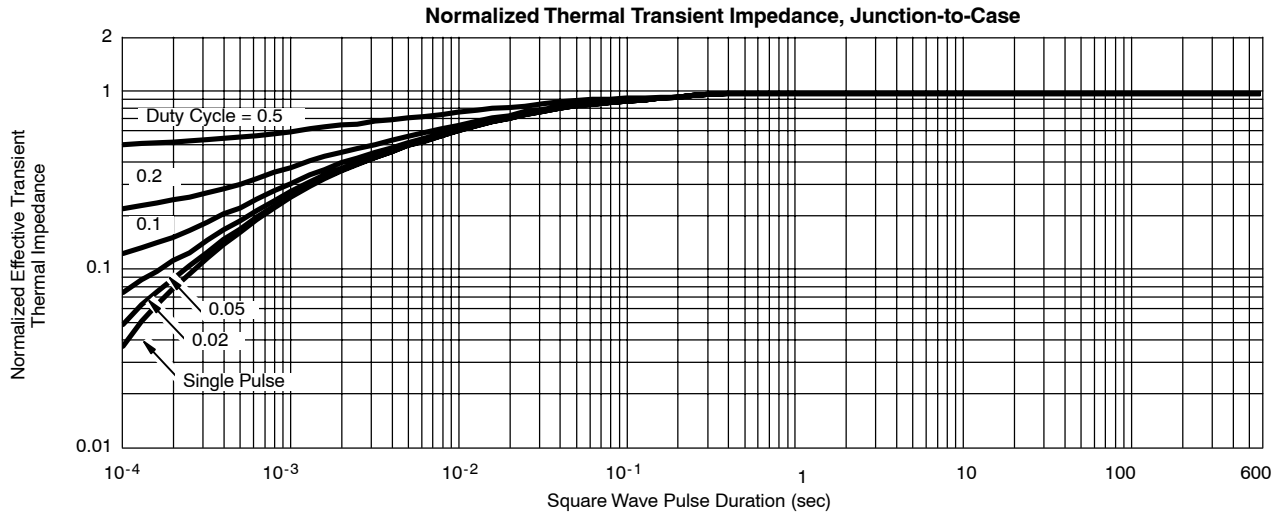
| SPECIFICATIONS (T _J = 25 °C UNLESS OTHERWISE NOTED) | | | | | | |
|--|----------------------|--|-----|------------------|------|------|
| Parameter | Symbol | Test Condition | Min | Typ ^a | Max | Unit |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | V _{(BR)DSS} | V _{GS} = 0 V, I _D = 250 μA | 20 | | | V |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} = V _{GS} , I _D = 250 μA | 0.5 | | 1.5 | |
| Gate-Body Leakage | I _{GSS} | V _{DS} = 0 V, V _{GS} = ±12 V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = 20 V, V _{GS} = 0 V | | | 1 | μA |
| | | V _{DS} = 20 V, V _{GS} = 0 V, T _J = 125 °C | | | 50 | |
| On-State Drain Current ^b | I _{D(on)} | V _{DS} = 5 V, V _{GS} = 4.5 V | 100 | | | A |
| Drain-Source On-State Resistance ^b | r _{DS(on)} | V _{GS} = 4.5 V, I _D = 20 A | | 0.0045 | | Ω |
| | | V _{GS} = 4.5 V, I _D = 20 A, T _J = 125 °C | | 0.0055 | | |
| | | V _{GS} = 2.5 V, I _D = 20 A | | 0.006 | | |
| Forward Transconductance ^b | g _{fs} | V _{DS} = 5 V, I _D = 40 A | 20 | | | S |
| Dynamic ^a | | | | | | |
| Input Capacitance | C _{iss} | V _{GS} = 0 V, V _{DS} = 20 V, f = 1 MHz | | 3660 | | pF |
| Output Capacitance | C _{oss} | | | 730 | | |
| Reverse Transfer Capacitance | C _{rss} | | | 375 | | |
| Total Gate Charge ^c | Q _g | V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 40 A | | 26 | 35 | nC |
| Gate-Source Charge ^c | Q _{gs} | | | 5 | | |
| Gate-Drain Charge ^c | Q _{gd} | | | 7 | | |
| Gate Resistance | R _g | | 1 | | 3.7 | Ω |
| Turn-On Delay Time ^c | t _{d(on)} | V _{DD} = 10 V, R _L = 0.25 Ω I _D ≅ 40 A, V _{GEN} = 4.5 V, R _G = 2.5 Ω | | 20 | 35 | ns |
| Rise Time ^c | t _r | | | 120 | 190 | |
| Turn-Off Delay Time ^c | t _{d(off)} | | | 45 | 70 | |
| Fall Time ^c | t _f | | | 20 | 35 | |
| Source-Drain Diode Ratings and Characteristic (T _C = 25 °C) | | | | | | |
| Pulsed Current | I _{SM} | | | | 100 | A |
| Diode Forward Voltage ^b | V _{SD} | I _F = 100 A, V _{GS} = 0 V | | 1.2 | 1.5 | V |
| Source-Drain Reverse Recovery Time | t _{rr} | I _F = 40 A, di/dt = 100 A/μs | | 35 | 70 | ns |

Notes

- a. Guaranteed by design, not subject to production testing.
b. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
c. Independent of operating temperature.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)



TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)**THERMAL RATINGS**

TO-252AA CASE OUTLINE



| DIM. | MILLIMETERS | | INCHES | |
|---------------------------------|-------------|-------|-----------|-------|
| | MIN. | MAX. | MIN. | MAX. |
| A | 2.18 | 2.38 | 0.086 | 0.094 |
| A1 | - | 0.127 | - | 0.005 |
| b | 0.64 | 0.88 | 0.025 | 0.035 |
| b2 | 0.76 | 1.14 | 0.030 | 0.045 |
| b3 | 4.95 | 5.46 | 0.195 | 0.215 |
| C | 0.46 | 0.61 | 0.018 | 0.024 |
| C2 | 0.46 | 0.89 | 0.018 | 0.035 |
| D | 5.97 | 6.22 | 0.235 | 0.245 |
| D1 | 5.21 | - | 0.205 | - |
| E | 6.35 | 6.73 | 0.250 | 0.265 |
| E1 | 4.32 | - | 0.170 | - |
| H | 9.40 | 10.41 | 0.370 | 0.410 |
| e | 2.28 BSC | | 0.090 BSC | |
| e1 | 4.56 BSC | | 0.180 BSC | |
| L | 1.40 | 1.78 | 0.055 | 0.070 |
| L3 | 0.89 | 1.27 | 0.035 | 0.050 |
| L4 | - | 1.02 | - | 0.040 |
| L5 | 1.14 | 1.52 | 0.045 | 0.060 |
| ECN: X12-0247-Rev. M, 24-Dec-12 | | | | |
| DWG: 5347 | | | | |

Note

- Dimension L3 is for reference only.

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