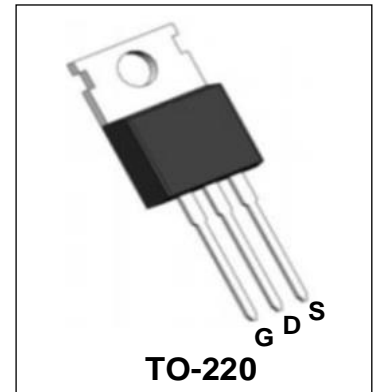


200V N-Channel Enhancement Mode Power MOSFET

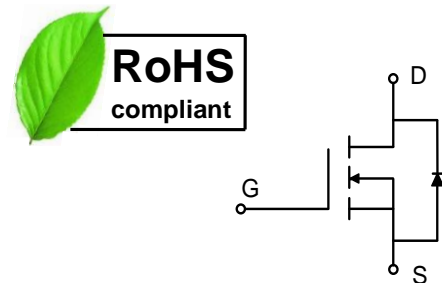
Description

WMK220N20HG3 uses Wayon's 3rd generation power trench MOSFET technology that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance. This device is well suited for high efficiency fast switching applications.



Features

- $V_{DS} = 200V$, $I_D = 78A$
 $R_{DS(on)} < 22m\Omega @ V_{GS} = 10V$
- Green Device Available
- 100% EAS Guaranteed
- Low Gate Charge
- High Speed Switching



Applications

- DC/DC Converter
- LED Backlighting
- Motor Control

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

| Parameter | | Symbol | Value | Unit |
|--|-----------------------|--|------------|------|
| Drain-Source Voltage | | V_{DS} | 200 | V |
| Gate-Source Voltage | | V_{GS} | ±20 | V |
| Continuous Drain Current | T _c =25°C | I_D | 78 | A |
| | T _c =100°C | | 49.4 | |
| Pulsed Drain Current ⁴ | | I_{DM} | 312 | A |
| Single Pulse Avalanche Energy ³ | | EAS | 146 | mJ |
| Total Power Dissipation | T _c =25°C | P_D | 312.5 | W |
| Operating Junction and Storage Temperature Range | | T_J , T_{STG} | -55 to 150 | °C |

Thermal Characteristics

| Parameter | Symbol | Value | Unit |
|--|------------------------|-------|------|
| Thermal Resistance from Junction-to-Ambient ¹ | R_{θJA} | 55 | °C/W |
| Thermal Resistance from Junction-to-Lead | R_{θJC} | 0.4 | °C/W |

Electrical Characteristics (T_c = 25°C, unless otherwise noted)

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|--|-----------------------|---|------|------|------|------|
| Static Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | V _{(BR)DSS} | V _{GS} = 0V, I _D = 250μA | 200 | - | - | V |
| Gate-Body Leakage Current | I _{GSS} | V _{DS} = 0V, V _{GS} = ±20V | - | - | ±100 | nA |
| Zero Gate Voltage Drain Current | T _J =25°C | V _{DS} = 200V, V _{GS} = 0V | - | - | 1 | μA |
| | T _J =100°C | | - | - | 100 | |
| Gate-Threshold Voltage | V _{GS(th)} | V _{DS} = V _{GS} , I _D = 250μA | 2 | 3 | 4 | V |
| Drain-Source on-Resistance ² | R _{DS(on)} | V _{GS} = 10V, I _D = 20A | - | 17.2 | 22 | mΩ |
| Forward Transconductance ² | g _{fs} | V _{DS} = 5V, I _D = 20A | - | 58 | - | S |
| Dynamic Characteristics | | | | | | |
| Input Capacitance | C _{iss} | V _{DS} = 100V, V _{GS} = 0V, f = 1MHz | - | 2850 | - | pF |
| Output Capacitance | C _{oss} | | - | 210 | - | |
| Reverse Transfer Capacitance | C _{rss} | | - | 8.5 | - | |
| Switching Characteristics | | | | | | |
| Gate Resistance | R _G | V _{DS} = 0V, V _{GS} = 0V, f = 1MHz | - | 3.3 | - | Ω |
| Total Gate Charge | Q _g | V _{GS} = 10V, V _{DS} = 100V, I _D = 20A | - | 37 | - | nC |
| Gate-Source Charge | Q _{gs} | | - | 9.5 | - | |
| Gate-Drain Charge | Q _{gd} | | - | 5.2 | - | |
| Turn-on Delay Time | t _{d(on)} | V _{GS} = 10V, V _{DS} = 100V, R _G = 3Ω, I _D = 20A | - | 11.5 | - | ns |
| Rise Time | t _r | | - | 18 | - | |
| Turn-off Delay Time | t _{d(off)} | | - | 18.5 | - | |
| Fall Time | t _f | | - | 6.8 | - | |
| Drain-Source Body Diode Characteristics | | | | | | |
| Diode Forward Voltage ² | V _{SD} | I _S = 20A, V _{GS} = 0V | - | - | 1.2 | V |
| Continuous Source Current ^{1,5} | I _S | V _G =V _D =0V, Force Current | - | - | 78 | A |
| Body Diode Reverse Recovery Time | t _{rr} | V _R = 100V, I _F = 20A, dI/dt = 100A/μs | - | 110 | - | ns |
| Body Diode Reverse Recovery Charge | Q _{rr} | | - | 405 | - | nC |

Notes:

- The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
- The EAS data shows Max. rating. The test condition is V_{DD}=30V, V_{GS}=10V, L=0.4mH, I_{AS}=27A.
- Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=150°C.
- The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.

Typical Characteristics

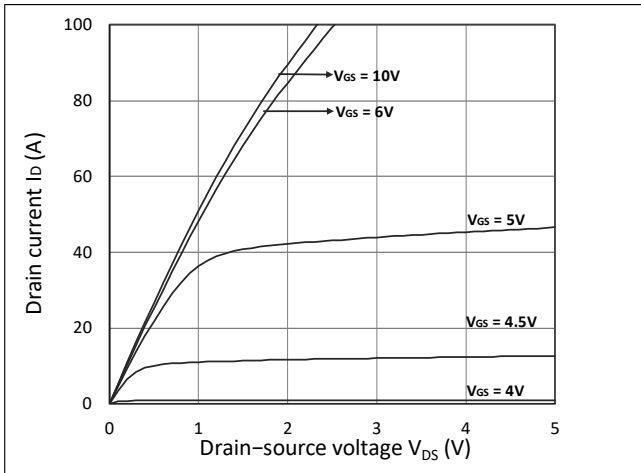


Figure 1. Output Characteristics

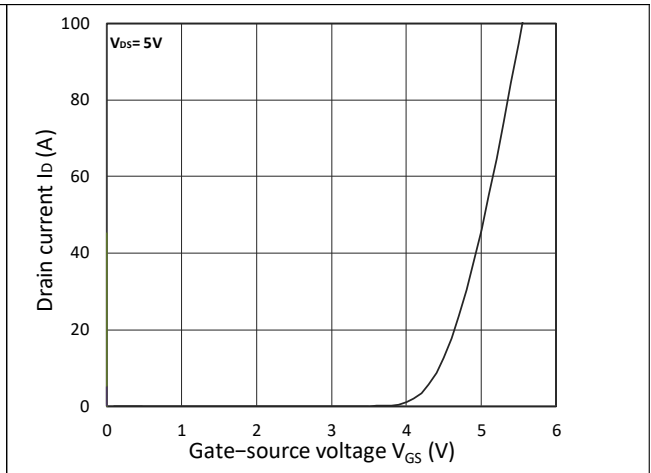


Figure 2. Transfer Characteristics

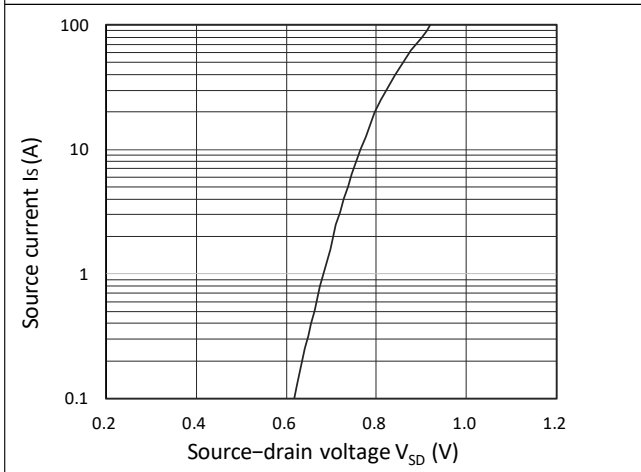


Figure 3. Forward Characteristics of Reverse

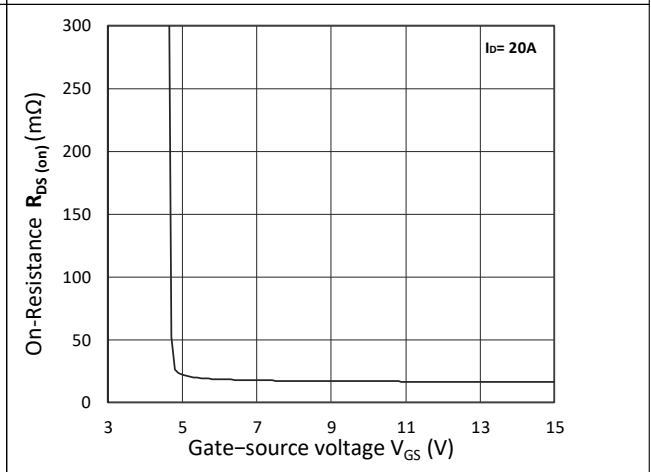


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

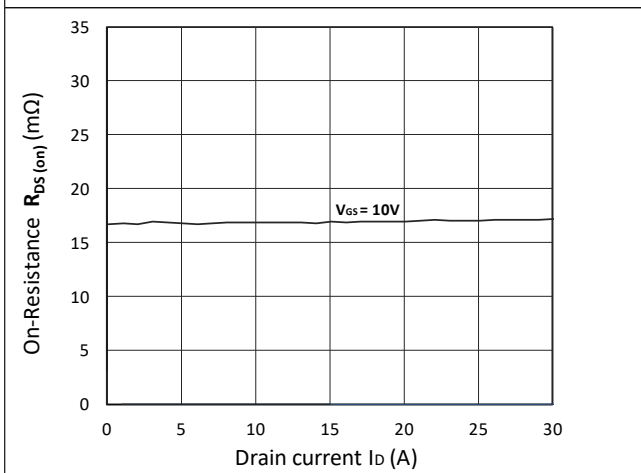


Figure 5. $R_{DS(ON)}$ vs. I_D

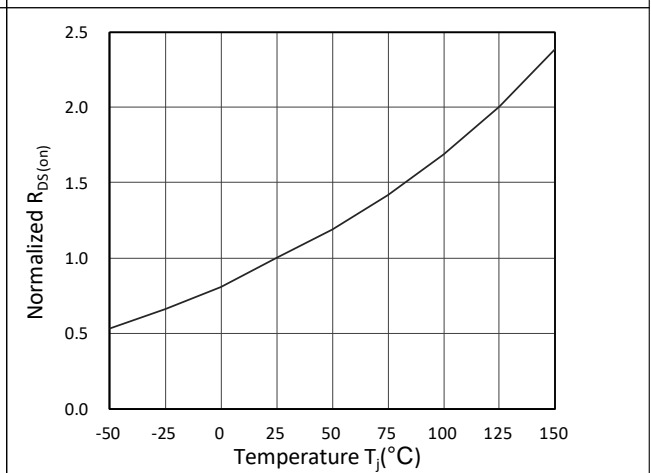


Figure 6. Normalized $R_{DS(ON)}$ vs. Temperature

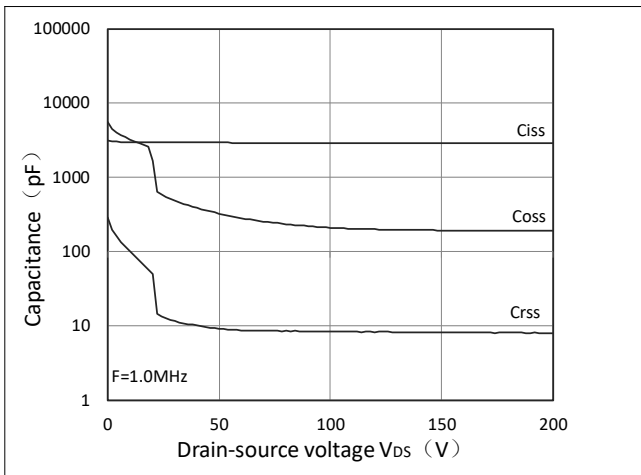


Figure 7. Capacitance Characteristics

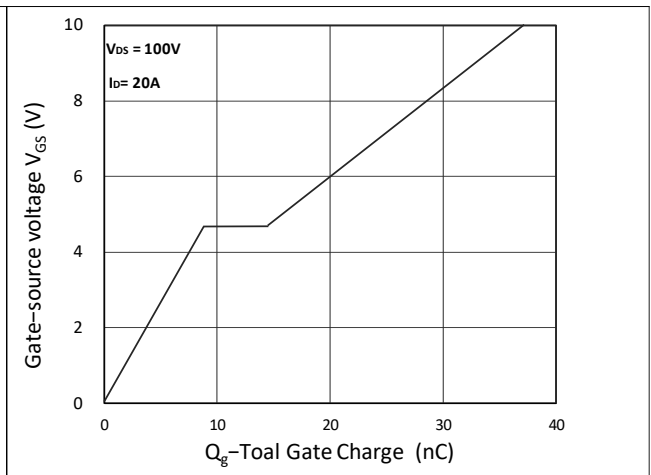


Figure 8. Gate Charge Characteristics

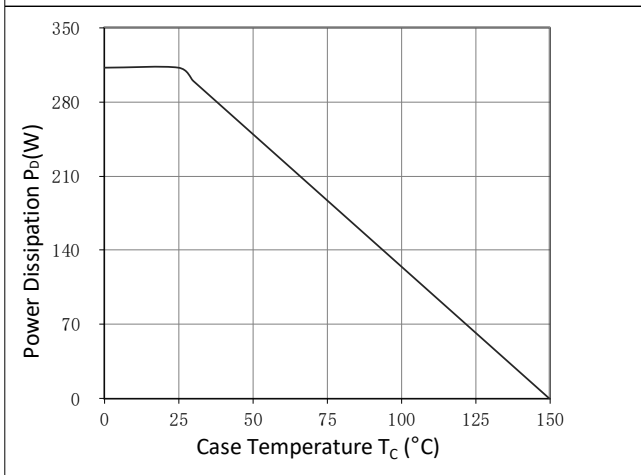


Figure 9. Power Dissipation

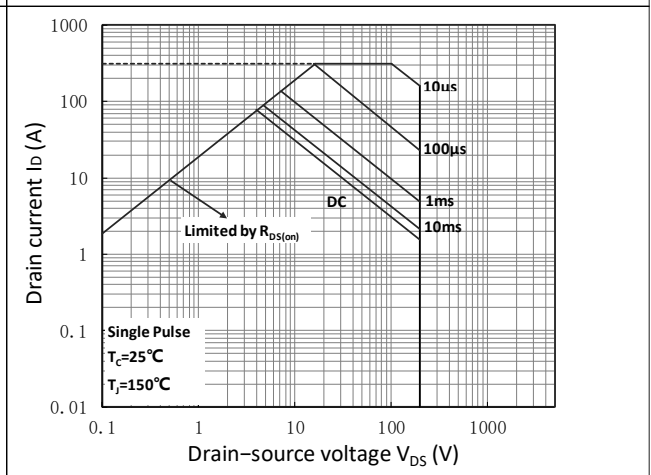


Figure 10. Safe Operating Area

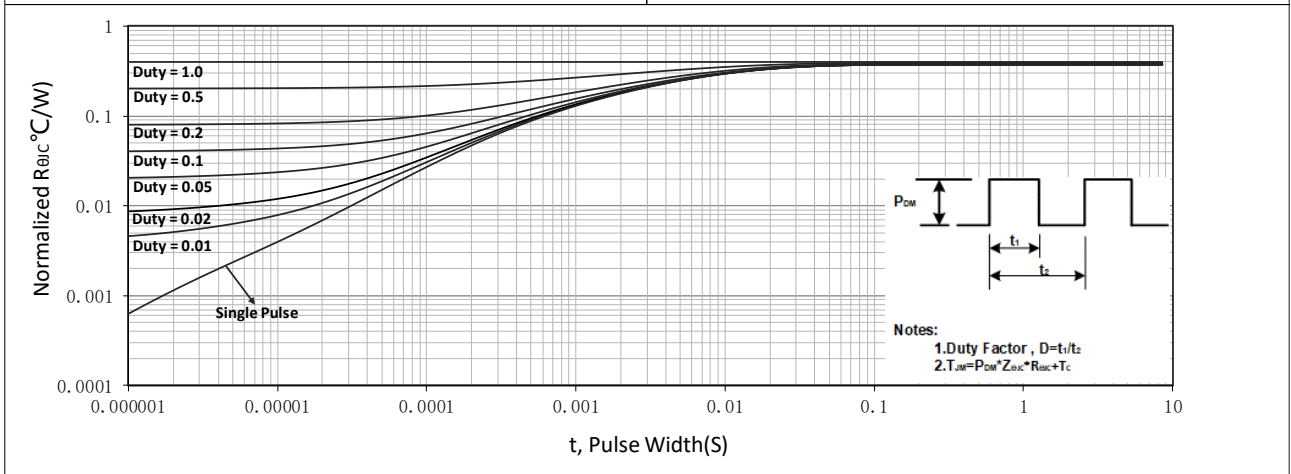


Figure 11. Normalized Maximum Transient Thermal Impedance

Test Circuit

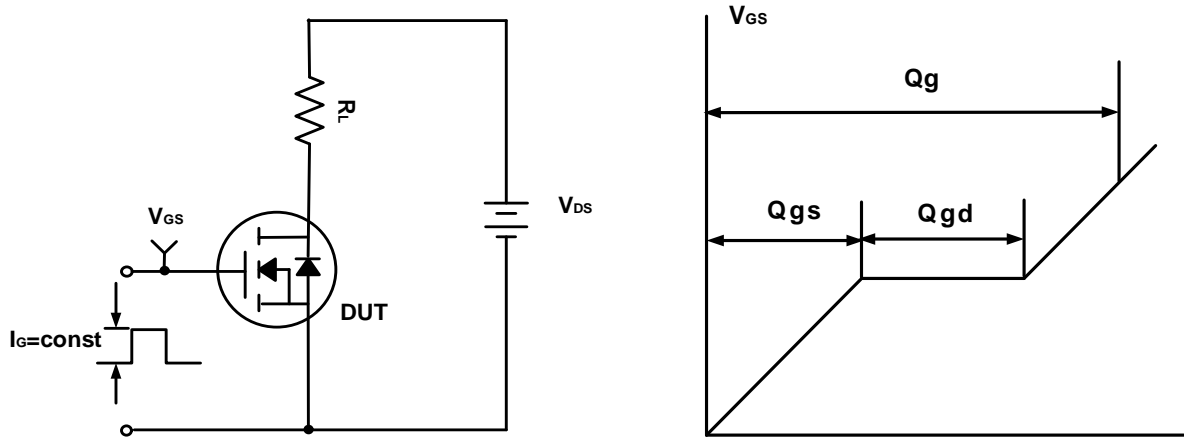


Figure A. Gate Charge Test Circuit & Waveforms

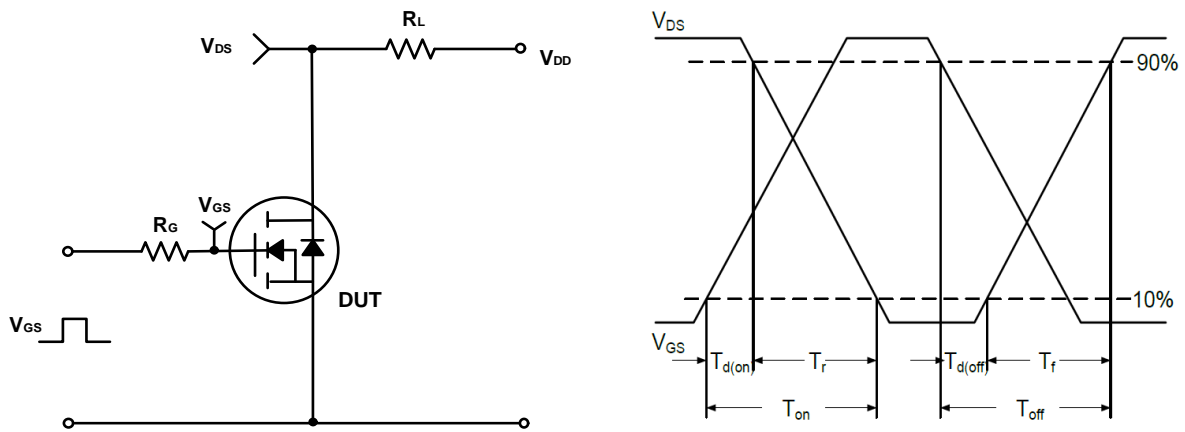


Figure B. Switching Test Circuit & Waveforms

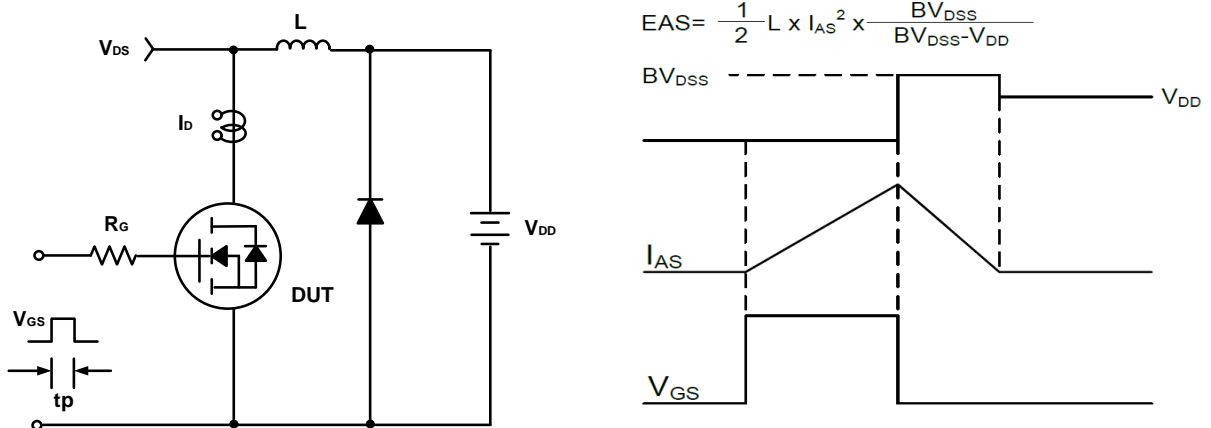
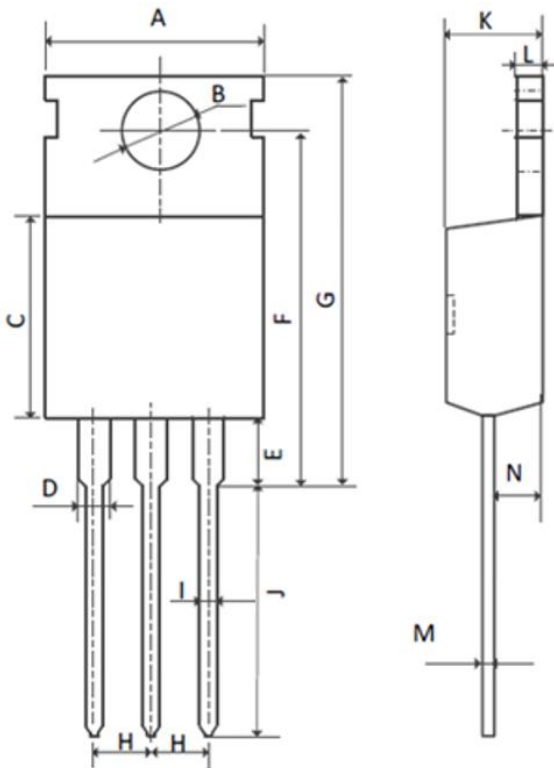


Figure C. Unclamped Inductive Switching Circuit & Waveforms

Mechanical Dimensions for TO-220



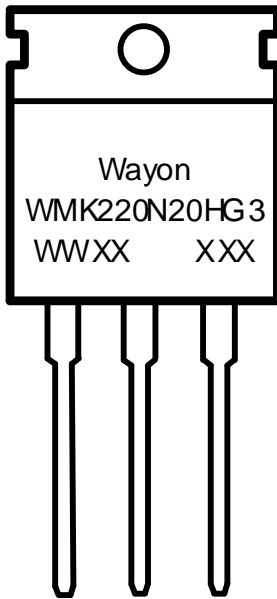
COMMON DIMENSIONS

| SYMBOL | MM | |
|--------|----------|-------|
| | MIN | MAX |
| A | 9.70 | 10.30 |
| B | 3.40 | 3.80 |
| C | 8.80 | 9.40 |
| D | 1.17 | 1.47 |
| E | 2.60 | 3.50 |
| F | 15.10 | 16.70 |
| G | 19.55MAX | |
| H | 2.54REF | |
| I | 0.70 | 0.95 |
| J | 9.35 | 11.00 |
| K | 4.30 | 4.77 |
| L | 1.20 | 1.45 |
| M | 0.40 | 0.65 |
| N | 2.20 | 2.60 |

Ordering Information

| Part | Package | Marking | Packing method |
|--------------|---------|--------------|----------------|
| WMK220N20HG3 | TO-220 | WMK220N20HG3 | Tube |

Marking Information



WMK220N20HG3 = Device code

WWXX XXX= Date code


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