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| **JMGG020V04A**  m  **Description**   |  |  |  | | --- | --- | --- | | **JMG** **N-channel** **Advanced** **Mode** **Power** **MOSFET** | | | | **Features**  40V,140A  RDS(ON)<2.2mΩ @ VGS = 10V  RDS(ON)<3.1mΩ @ VGS = 4.5V  Advanced Split Gate Trench Technology  Excellent RDS(ON) and Low Gate Charge  Lead free product is acquired | **Application**  Load Switch  PWM Application  Power management |  | | *100%* *UIS* *TESTED!* *100%* *ΔVds* *TESTED!* |  | | **Schematic** **Diagram**  **PDFN5X6-8L**  **Marking** **and** **pin** **Assignment** | | |   **Package** **Marking** **and** **Ordering** **Information**   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **Device** **Marking** | **Device** | **OUTLINE** | **Device** **Package** | **Reel** **Size** | **Reel** **(PCS)** | **Per** **Carton**  **(PCS)** | | G020V04A | JMGG020V04A | TAPING | PDFN5X6-8L | 13inch | 5000 | 80000 |   **Absolute** **Maximum** **Ratings** (TC=25℃ unless otherwise specified)   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Symbol** | **Parameter** | | **Max.** | **Units** | | VDSS | Drain-Source Voltage | | 40 | V | | VGSS | Gate-Source Voltage | | ±20 | V | | ID | Continuous Drain Current | TC = 25℃ | 140 | A | | TC = 100℃ | 91 | A | | IDM | Pulsed Drain Current note1 | | 560 | A | | EAS | Single Pulsed Avalanche Energy note2 | | 125 | J | | PD | Power Dissipation | TC = 25℃ | 73 | W | | RθJC | Thermal Resistance, Junction to Case | | 1.7 | ℃/W | | TJ , TSTG | Operating and Storage Temperature Range | | -55 to +150 | ℃ |   **JieJie** **Microelectronics** **CO.** **,** **Ltd** Version :1.0  **-** **1** **-** |

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| **JMGG020V04A**  μ  n  m  p  p  p  n  n  n  n  **Electrical** **Characteristics** (TJ=25℃ unless otherwise specified)   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **Symbol** | **Parameter** | **Test** **Condition** | **Min.** | **Typ.** | **Max.** | **Units** | | **Off** **Characteristic** | | | | | | | | V(BR)DSS | Drain-Source Breakdown Voltage | VGS=0V, ID=250μA | 40 | - | - | V | | IDSS | Zero Gate Voltage Drain Current | VDS=40V, VGS=0V, | - | - | 1.0 | A | | IGSS | Gate to Body Leakage Current | VDS=0V, VGS= ±20V | - | - | ±100 | A | | **On** **Characteristics** | | | | | | | | VGS(th) | Gate Threshold Voltage | VDS=VGS , ID=250μA | 1.0 | - | 2.5 | V | | RDS(on) | Static Drain-Source on-Resistance note3 | VGS=10V, ID=30A | - | 1.7 | 2.2 | Ω | | VGS=4.5V, ID=20A | - | 2.2 | 3.1 | | **Dynamic** **Characteristics** | | | | | | | | Ciss | Input Capacitance | VDS=20V, VGS=0V,  f=1.0MHz | - | 3162 | - | F | | Coss | Output Capacitance | - | 1099 | - | F | | Crss | Reverse Transfer Capacitance | - | 157 | - | F | | Qg | Total Gate Charge | VDS=20V, ID=75A,  VGS=10V | - | 95 | - | C | | Qgs | Gate-Source Charge | - | 15 | - | C | | Qgd | Gate-Drain(“Miller”) Charge | - | 11 | - | C | | **Switching** **Characteristics** | | | | | | | | td(on) | Turn-on Delay Time | V DD=20V, ID=75A, RG=1.6Ω , VGS=10V | - | 12.5 | - | ns | | tr | Turn-on Rise Time | - | 7 | - | ns | | td(off) | Turn-off Delay Time | - | 50 | - | ns | | tf | Turn-off Fall Time | - | 8.5 | - | ns | | **Drain-Source** **Diode** **Characteristics** **and** **Maximum** **Ratings** | | | | | | | | IS | Maximum Continuous Drain to Source Diode Forward Current | | - | - | 140 | A | | ISM | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | 560 | A | | VSD | Drain to Source Diode Forward Voltage | VGS=0V, IS=30A | - | - | 1.2 | V | | trr | Body Diode Reverse Recovery Time | TJ=25℃ ,  IF=IS ,dI/dt=100A/μs | - | 31 | - | ns | | Qrr | Body Diode Reverse Recovery Charge | - | 110 | - | C |   Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature  2. EAS condition: TJ=25℃, VDD=20V, VG=10V, RG=25Ω , L=0.5mH, IAS=22.4A  3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%  **JieJie** **Microelectronics** **CO.** **,** **Ltd** Version :1.0  **-** **2** **-** |



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| |  |  |  |  |  | | --- | --- | --- | --- | --- | | VDS=20V ID=75A |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  | Qg(nC) |  |  |   **Figure** **5:** Gate Charge Characteristics VGS(V)  10  8  6  4  2  0   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  |  |  |  | |  |  |  |  |  | |  | 125℃ |  | TJ=25℃ |  | |  |  |  |  |  | |  |  |  |  |  | |  |  | VSD(V) |  |  |   1.0E+01 1.0E+00  1.0E-01  1.0E-02  1.0E-03  1.0E-04  1.0E-05  3.5  3.0  2.5  2.0  1.5  1.0  0.5 0  10V 4.5V  4V  VGS=2.5V  VDS(V)  200  160  120  80  40  0  200  160  120  80  40  0  **Figure** **2:** Typical Transfer Characteristics  **Figure** **3:**On-resistance vs. Drain Current  10 20 30 40  0 1.0 2.0 3.0 4.0 5.0  0 20 40 60 80 1  00  IS(A)  ID (A)  **JMGG020V04A**  **Typical** **Performance** **Characteristics**  **Figure1:** Output Characteristics  ID (A)   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  |  |  |  | |  |  |  |  |  | |  |  | TJ=125℃ | |  | |  |  |  |  | 25℃ | |  |  | VGS(V) |  |  |   0 1 2 3 4 5  **Figure** **4**: Body Diode Characteristics  RDS(ON) (mΩ)   |  |  |  |  | | --- | --- | --- | --- | |  |  |  |  | |  |  |  |  | |  |  | VGS=4.5V |  | |  |  | |  |  |  |  | |  | VGS=10V | |  |  |  | |  | ID(A) | |  |   0.0 0.2 0.4 0.6 0.8 1.0  **Figure** **6:** Capacitance Characteristics  C(pF)  105  104  Ciss  Coss  102 Crss  101 VDS(V)  103  0 8 16 24 32 40  **JieJie** **Microelectronics** **CO.** **,** **Ltd** Version :1.0  **-** **3** **-** |

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| **Figure** **7:** Normalized Breakdown Voltage vs. Junction Temperature  VBR(DSS) | **Figure** **8:** Normalized on Resistance vs.  Junction Temperature  RDS(on) | | |
| 0.9  1.3  1.0  1.2  1.1  0  20  0   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  | |  |  |  |  |  |  | |  |  |  |  |  |  | |  |  |  |  |  |  | |  |  |  |  |  |  | |  |  |  |  |  |  | |  |  |  |  |  |  | |  |  |  |  |  |  | |  |  |  |  |  |  | |  |  | Tj (℃) | |  |  |   - 100 -50 0 50 100 150 |
| 2.5  2.0  1.5  1.0  0.5 | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  | |  |  |  |  |  |  | |  |  |  |  |  |  | |  |  | Tj (℃) | |  |  | | |
| -100 -50 0 50 100 150 200  **Figure** **10:** Maximum Continuous Drain Current vs. Case Temperature | | |
| **Figure** **9:** Maximum Safe Operating Area  ID(A) |
| 200  150  120  90  60  30  0 | | ID(A) |
| 102  103  101  Limited by RDS(on)  10μs  100μs  1ms  10ms  TC=25℃  Single pulse  VDS (V)  100ms  DC  0. 1 1 10 100 |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  | |  |  |  | Tc (℃) |  |  |  | |
| 0 25 50 75 100 125 150 175 | | |
| **Figure.11:** Maximum Effective  Transient Thermal Impedance, Junction-to-Case | | | |
| ZthJ-C(℃/W)  D=0.5 D=0.2 D=0.1 D=0.05 D=0.02  D=0.01  Single  101  100  10- 1  10-2  10-3  10-5 10-4 10-3 10-2 10- 1 100 101  otes:N  utyfactort/tpulse1.DD=12  (s)TPeak+th\*ZJ=JCC2.PTPDMT  t1 t2  PDM  10-6 | | | |
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| **JMGG020V04A**  **Test** **Circuit**    **Figure1:Gate** **Charge** **Test** **Circuit** **&** **Waveform**    **Figure** **2:** **Resistive** **Switching** **Test** **Circuit** **&** **Waveforms**    **Figure** **3:Unclamped** **Inductive** **Switching** **Test** **Circuit** **&** **Waveforms**  **JieJie** **Microelectronics** **CO.** **,** **Ltd** Version :1.0  **-** **5** **-** |

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| **JMGG020V04A**  **Package** **Mechanical** **Data-** **PDFN5X6-8L**     |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Symbol** | **Dimensions** **In** **Millimeters** | | **Dimensions** **In** **Inches** | | | **Min** | **Max** | **Min** | **Max** | | A | 0.870 | 0.930 | 0.034 | 0.036 | | A3 | 0. 152REF | | 0.006REF | | | D | 4.944 | 5.096 | 0. 195 | 0.201 | | E | 5.974 | 6. 126 | 0.235 | 0.241 | | D1 | 3.910 | 4. 110 | 0. 154 | 0. 162 | | E1 | 3.375 | 3.575 | 0. 133 | 0. 141 | | D2 | 4.870 | 4.930 | 0. 192 | 0. 194 | | E2 | 5.720 | 5.780 | 0.226 | 0.228 | | k | 1. 190 | 1.390 | 0.047 | 0.055 | | b | 0.350 | 0.410 | 0.014 | 0.016 | | e | 1.270TYP. | |  | | | L | 0.559 | 0.711 | 0.022 | 0.028 | | L1 | 0.424 | 0.576 | 0.017 | 0.023 | | H | 0.574 | 0.726 | 0.023 | 0.029 | | θ | 10° | 12° | 10° | 12° | | Φ | 1. 150 | 1.250 | 0.045 | 0.049 |   **JieJie** **Microelectronics** **CO.** **,** **Ltd** Version :1.0  **-** **6** **-** |

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