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|  **JMGG020V04A**m**Description**

|  |
| --- |
| **JMG** **N-channel** **Advanced** **Mode** **Power** **MOSFET** |
| **Features** 40V,140ARDS(ON)<2.2mΩ @ VGS = 10VRDS(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 | ℃ |

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|  **JMGG020V04A**μnmpppnnnn**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 Temperature2. EAS condition: TJ=25℃, VDD=20V, VG=10V, RG=25Ω , L=0.5mH, IAS=22.4A3. 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)1086420

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |
|  | 125℃ |  | TJ=25℃ |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  | VSD(V) |  |  |

1.0E+01 1.0E+001.0E-011.0E-021.0E-031.0E-041.0E-053.53.02.52.01.51.00.5 010V 4.5V4VVGS=2.5VVDS(V)2001601208040020016012080400**Figure** **2:** Typical Transfer Characteristics**Figure** **3:**On-resistance vs. Drain Current10 20 30 400 1.0 2.0 3.0 4.0 5.00 20 40 60 80 100IS(A)ID (A)**JMGG020V04A****Typical** **Performance** **Characteristics****Figure1:** Output CharacteristicsID (A)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  | TJ=125℃ |  |
|  |  |  |  | 25℃ |
|  |  | VGS(V) |  |  |

0 1 2 3 4 5**Figure** **4**: Body Diode CharacteristicsRDS(ON) (mΩ)

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
|  |  | VGS=4.5V |  |
|  |  |
|  |  |  |  |
|  | VGS=10V |
|  |  |  |
|  | ID(A) |  |

0.0 0.2 0.4 0.6 0.8 1.0**Figure** **6:** Capacitance CharacteristicsC(pF)105104CissCoss102 Crss101 VDS(V)1030 8 16 24 32 40**JieJie** **Microelectronics** **CO.** **,** **Ltd** Version :1.0**-** **3** **-** |

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|  **JMGG020V04A** |
| **Figure** **7:** Normalized Breakdown Voltage vs. Junction TemperatureVBR(DSS) | **Figure** **8:** Normalized on Resistance vs.Junction TemperatureRDS(on) |
| 0.91.31.01.21.10200

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
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|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  | Tj (℃) |  |  |

- 100 -50 0 50 100 150 |
| 2.52.01.51.00.5 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  | Tj (℃) |  |  |

 |
| -100 -50 0 50 100 150 200**Figure** **10:** Maximum Continuous Drain Current vs. Case Temperature |
| **Figure** **9:** Maximum Safe Operating AreaID(A) |
| 2001501209060300 | ID(A) |
| 102103101Limited by RDS(on)10μs100μs1ms10msTC=25℃Single pulseVDS (V)100msDC0. 1 1 10 100 |
|

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  | Tc (℃) |  |  |  |

 |
| 0 25 50 75 100 125 150 175 |
| **Figure.11:** Maximum EffectiveTransient Thermal Impedance, Junction-to-Case |
| ZthJ-C(℃/W)D=0.5 D=0.2 D=0.1 D=0.05 D=0.02D=0.01Single10110010- 110-210-310-5 10-4 10-3 10-2 10- 1 100 101otes:Nutyfactort/tpulse1.DD=12(s)TPeak+th\*ZJ=JCC2.PTPDMTt1 t2PDM10-6 |
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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 |

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