



Micro Commercial Components



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20736 Marilla Street Chatsworth
CA 91311
Phone: (818) 701-4933
Fax: (818) 701-4939

MCU50P04

Features

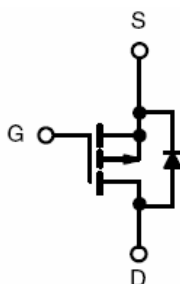
- High density cell design for ultra low $R_{ds(on)}$
- Fully characterized avalanche voltage and current
- Halogen free available upon request by adding suffix "-HF"
- Good stability and uniformity with high E_{AS}
- Epoxy meets UL 94 V-0 flammability rating
- Moisture Sensitivity Level 1

Maximum Ratings @ 25°C Unless Otherwise Specified

| Symbol | Parameter | Rating | Unit |
|-----------------|---------------------------------------|-------------|------|
| V_{DS} | Drain-source Voltage | -40 | V |
| I_D | Drain Current-Continuous | -50 | A |
| E_{AS} | Single Pulsed Avalanche Energy(note1) | 840 | mJ |
| V_{GS} | Gate-source Voltage | ± 20 | V |
| I_{DM} | Pulsed Drain Current | -115 | A |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case | 1.92 | °C/W |
| T_J | Operating Junction Temperature | -55 to +150 | °C |
| T_{STG} | Storage Temperature | -55 to +150 | °C |
| P_D | Power Dissipation | 65 | W |

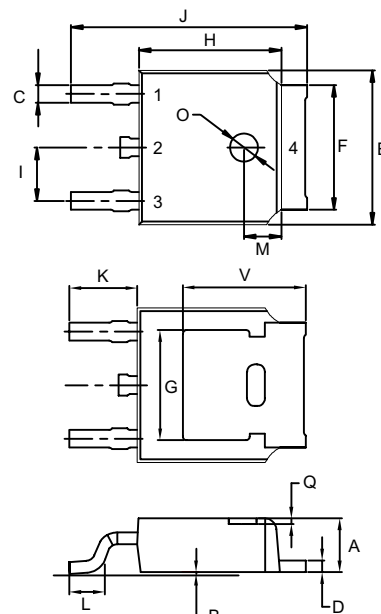
Note1.EAS condition: $T_J=25^\circ\text{C}$, $V_{DD}=-20\text{V}$, $V_G=-10\text{V}$, $L=1\text{mH}$, $R_g=25\Omega$, $I_{AS}=41\text{A}$

Internal Block Diagram



P-Channel Enhancement Mode Field Effect Transistor

DPAK



PIN 1 GATE
PIN 2,4 DRAIN
PIN 3 SOURCE

| DIM | INCHES | | MM | | NOTE |
|-----|--------|-------|------|-------|------|
| | MIN | MAX | MIN | MAX | |
| A | 0.087 | 0.094 | 2.20 | 2.40 | |
| B | 0.000 | 0.005 | 0.00 | 0.13 | |
| C | 0.026 | 0.034 | 0.66 | 0.86 | |
| D | 0.018 | 0.023 | 0.46 | 0.58 | |
| E | 0.256 | 0.264 | 6.50 | 6.70 | |
| F | 0.201 | 0.215 | 5.10 | 5.46 | |
| G | 0.190 | | 4.83 | | |
| H | 0.236 | 0.244 | 6.00 | 6.20 | |
| I | 0.086 | 0.094 | 2.18 | 2.39 | |
| J | 0.386 | 0.409 | 9.80 | 10.40 | |
| K | 0.114 | | 2.90 | | |
| L | 0.055 | 0.067 | 1.40 | 1.70 | |
| M | 0.063 | | 1.60 | | |
| O | 0.043 | 0.051 | 1.10 | 1.30 | |
| Q | 0.000 | 0.012 | 0.00 | 0.30 | |
| | 0.211 | | 5.35 | | |

Electrical characteristics (T_a=25°C unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|------------------------------------|---------------------|---|------|------|------|------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | V _{GS} =0V I _D =-250μA | -40 | - | - | V |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} =-40V, V _{GS} =0V | - | - | -1 | μA |
| Gate-Body Leakage Current | I _{GSS} | V _{GS} =±20V, V _{DS} =0V | - | - | ±100 | nA |
| On Characteristics (Note 2) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} =V _{GS} , I _D =-250μA | -1.2 | -1.9 | -2.5 | V |
| Drain-Source On-State Resistance | R _{DS(ON)} | V _{GS} =-10V, I _D =-14A | - | 9 | 13 | mΩ |
| Forward Transconductance | g _{FS} | V _{DS} =-10V, I _D =-20A | - | 50 | - | S |
| Dynamic Characteristics (Note3) | | | | | | |
| Input Capacitance | C _{ISS} | V _{DS} =-20V, V _{GS} =0V, F=1.0MHz | - | 5020 | - | PF |
| Output Capacitance | C _{OSS} | | - | 551 | - | PF |
| Reverse Transfer Capacitance | C _{RSS} | | - | 374 | - | PF |
| Switching Characteristics (Note 3) | | | | | | |
| Turn-on Delay Time | t _{d(on)} | V _{DD} =-20V, R _L =1Ω, V _{GS} =-10V, R _G =3Ω | - | 9.4 | - | nS |
| Turn-on Rise Time | t _r | | - | 20 | - | nS |
| Turn-Off Delay Time | t _{d(off)} | | - | 55 | - | nS |
| Turn-Off Fall Time | t _f | | - | 30 | - | nS |
| Total Gate Charge | Q _g | V _{DS} =-20, I _D =-14A, V _{GS} =-10V | - | 77 | | nC |
| Gate-Source Charge | Q _{gs} | | - | 19 | | nC |
| Gate-Drain Charge | Q _{gd} | | - | 21 | | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage (Note 2) | V _{SD} | V _{GS} =0V, I _S =-10A | - | | -1.2 | V |
| Diode Forward Current (Note 1) | I _S | | - | - | -50 | A |
| Reverse Recovery Time | t _{rr} | TJ = 25°C, IF =- 10A | - | 49 | | nS |
| Reverse Recovery Charge | Q _{rr} | di/dt = -100A/μs(Note2) | - | 47 | | nC |
| Forward Turn-On Time | t _{on} | Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD) | | | | |

Notes:

1. Surface Mounted on FR4 Board, t ≤ 10 sec.
2. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
3. Guaranteed by design, not subject to production

Typical Electrical and Thermal Characteristics (Curves)

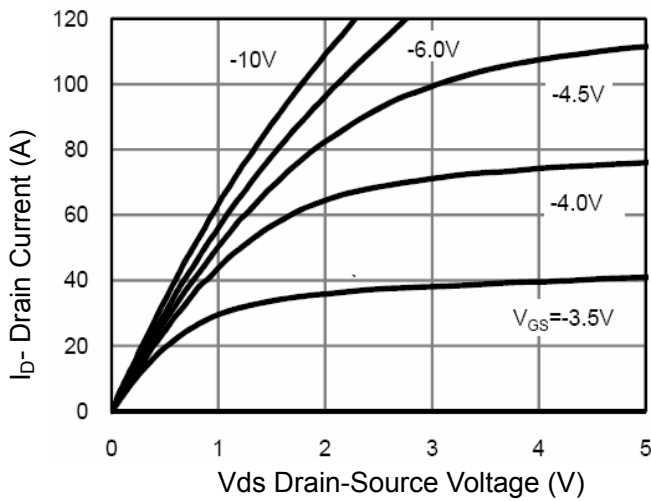


Figure 1 Output Characteristics

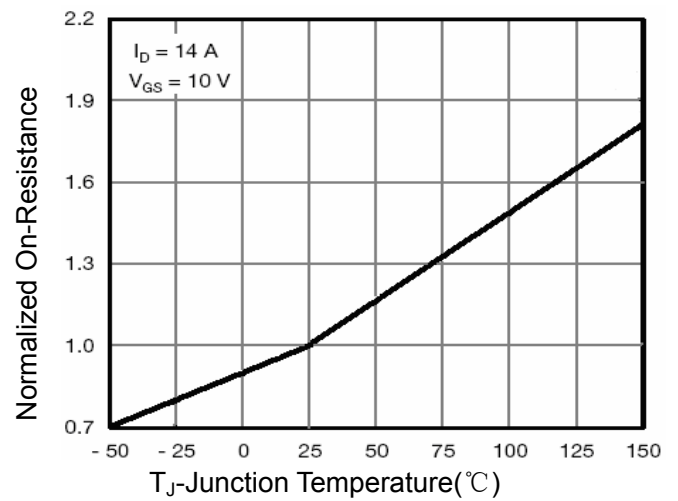


Figure 4 Rdson-Junction Temperature

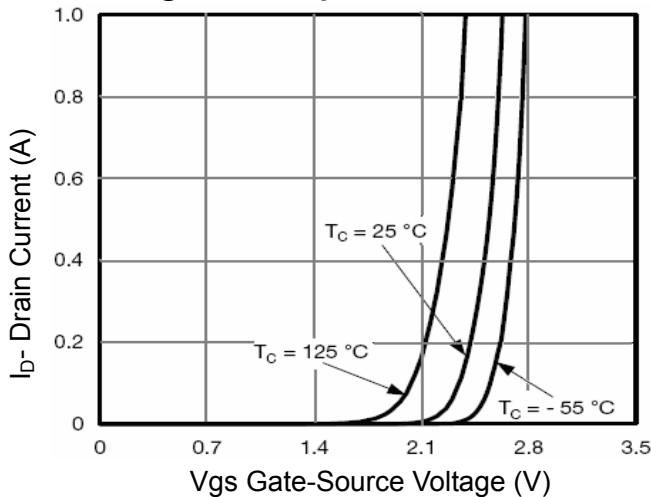


Figure 2 Transfer Characteristics

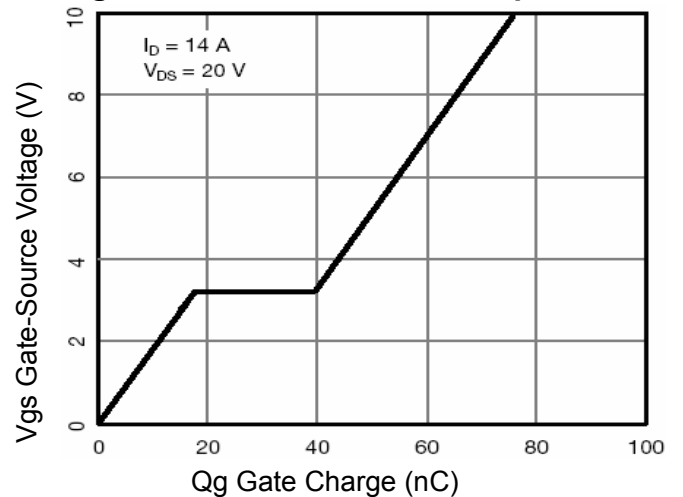


Figure 5 Gate Charge

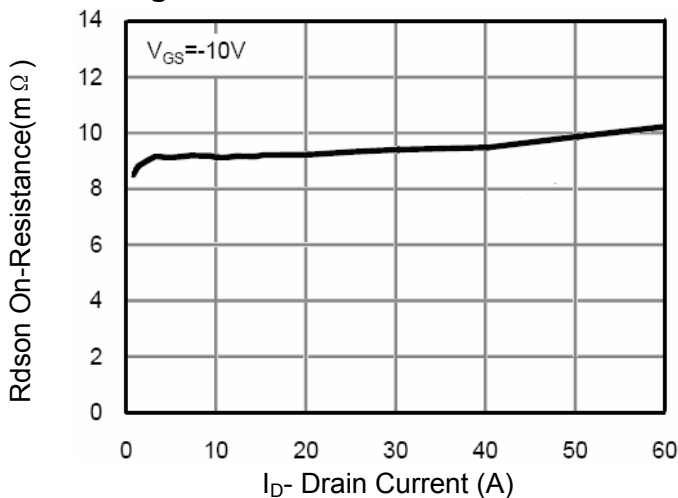


Figure 3 Rdson- Drain Current

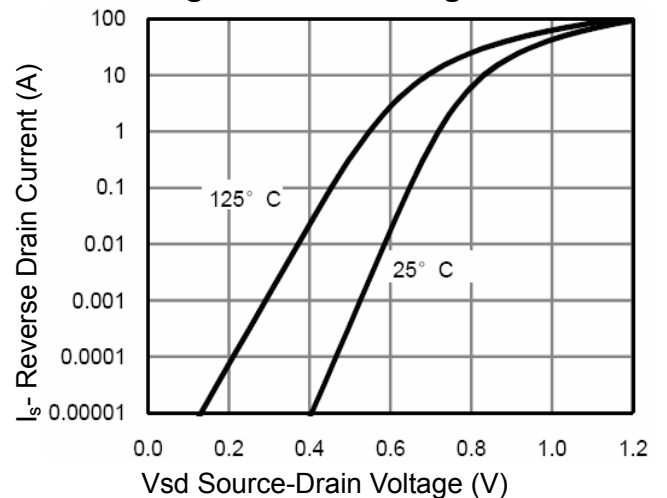


Figure 6 Source- Drain Diode Forward

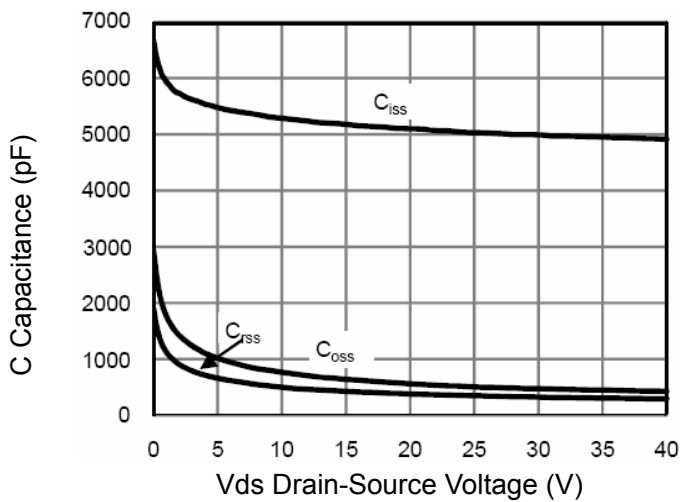


Figure 7 Capacitance vs Vds

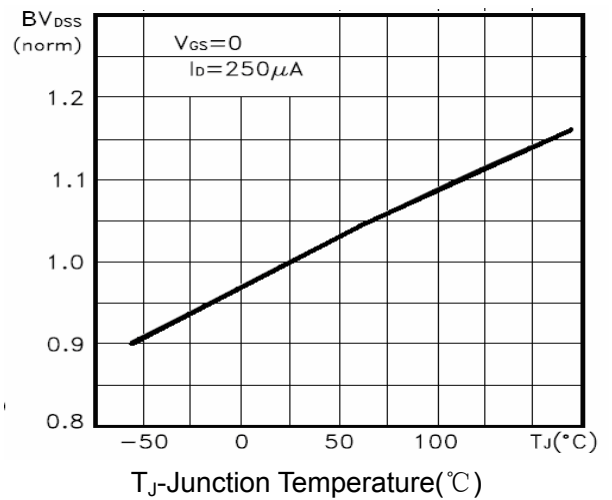


Figure 9 BV_{DSS} vs Junction Temperature

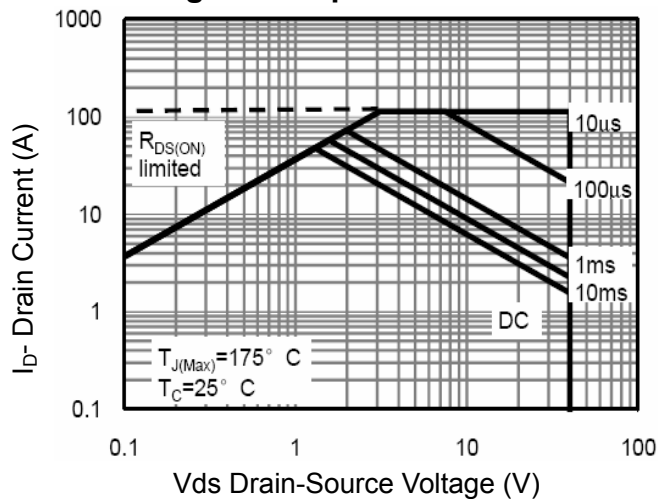


Figure 8 Safe Operation Area

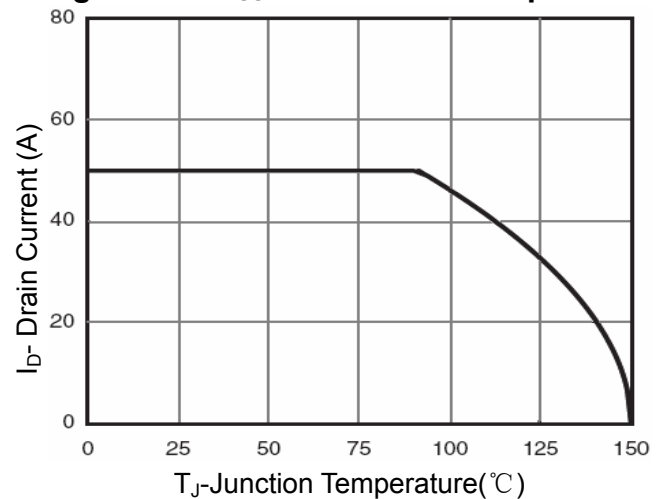


Figure 10 I_D Current Derating vs Junction Temperature

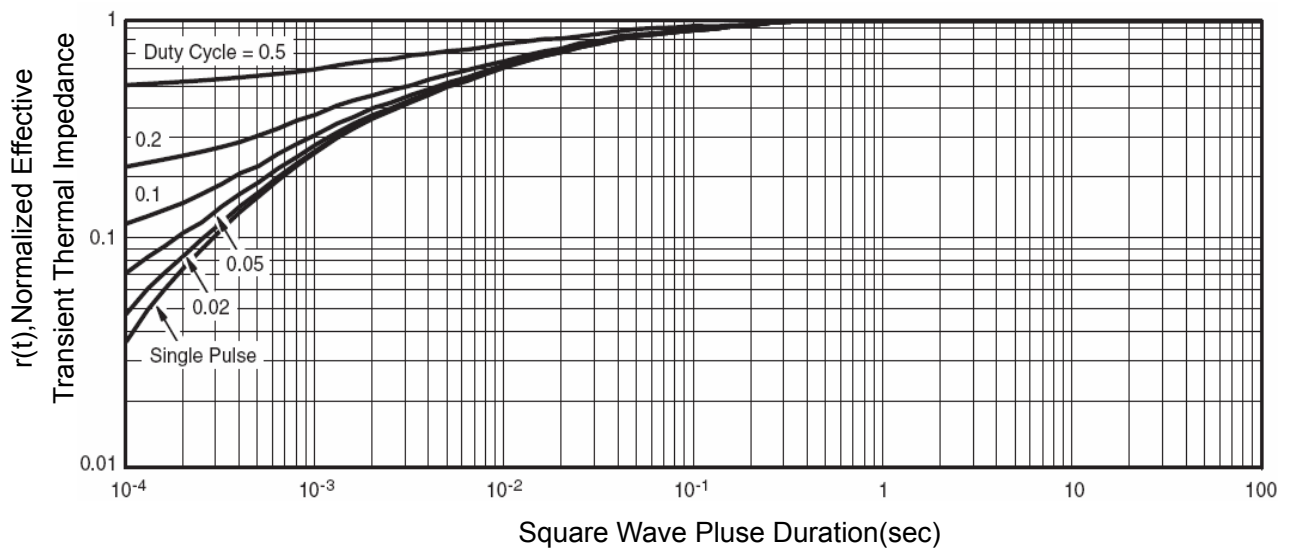


Figure 11 Normalized Maximum Transient Thermal Impedance



Ordering Information :

| Device | Packing |
|----------------|------------------------|
| Part Number-TP | Tape&Reel:2.5Kpcs/Reel |

Note : Adding "-HF" suffix for halogen free, eg. Part Number-TP-HF

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