Micro Commercial Components

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MCU50P04

P-Channel
Enhancement Mode
Field Effect Transistor

Features

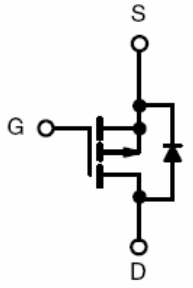
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Halogen free available upon request by adding suffix "-HF"
- Good stability and uniformity with high E_{AS}
- Epoxy meets UL 94 V-0 flammability rating
- Moisture Sensitivity Level 1

Maximum Ratings @ 25°C Unless Otherwise Specified

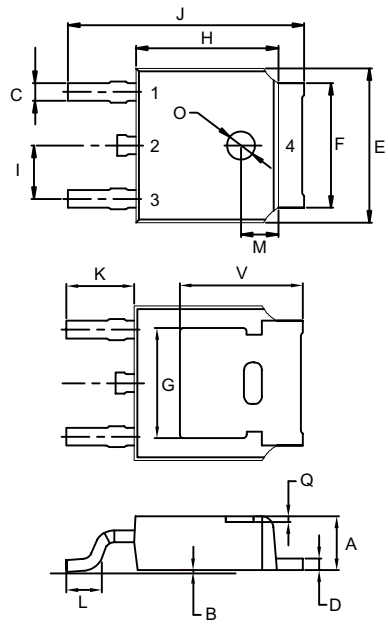
Symbol	Parameter	Rating	Unit
V_{DS}	Drain-source Voltage	-40	V
I_D	Drain Current-Continuous	-50	A
E_{AS}	Single Pulsed Avalanche Energy(note1)	840	mJ
V_{GS}	Gate-source Voltage	±20	V
I_{DM}	Pulsed Drain Current	-115	A
$R_{\theta JC}$	Thermal Resistance Junction to Case	1.92	℃/W
T_J	Operating Junction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

Note1.EAS condition: Tj=25℃,VDD=-20V,VG=-10V,L=1mH,Rg=25Ω,IAS=41A

Internal Block Diagram



DPAK



PIN 1 GATE
PIN 2.4 DRAIN
PIN 3 SOURCE

DIMENSIONS					
	INCHES		MM		
DIM	MIN	MAX	MIN	MAX	NOTE
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℃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_{lss}	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 di/dt = -100A/μs(Note2)	-	49		nS
Reverse Recovery Charge	Qrr		-	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)

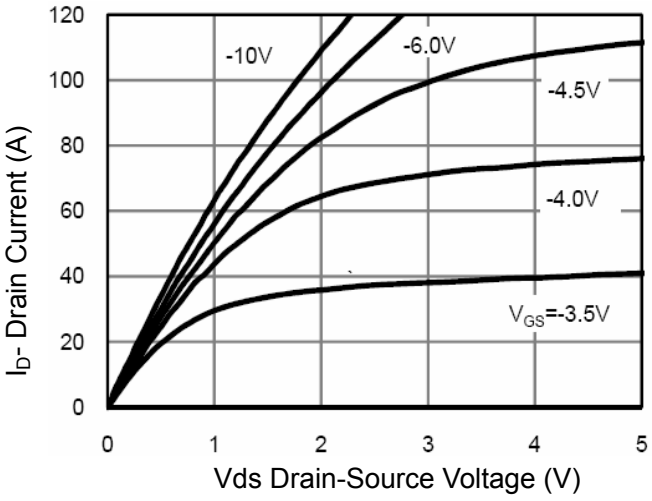


Figure 1 Output Characteristics

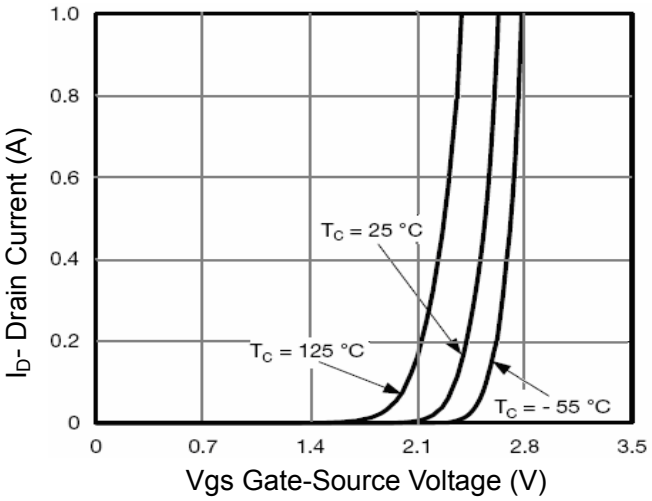


Figure 2 Transfer Characteristics

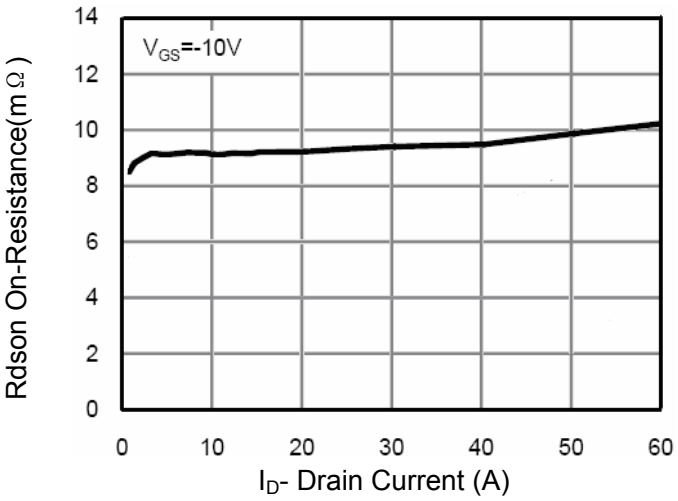


Figure 3 Rdson- Drain Current

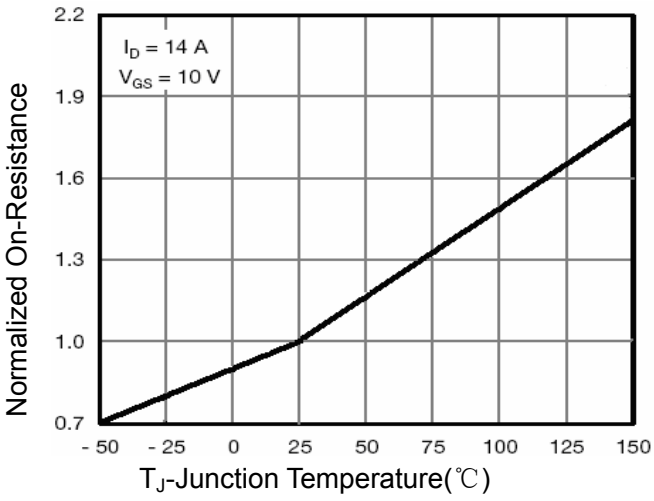


Figure 4 Rdson-Junction Temperature

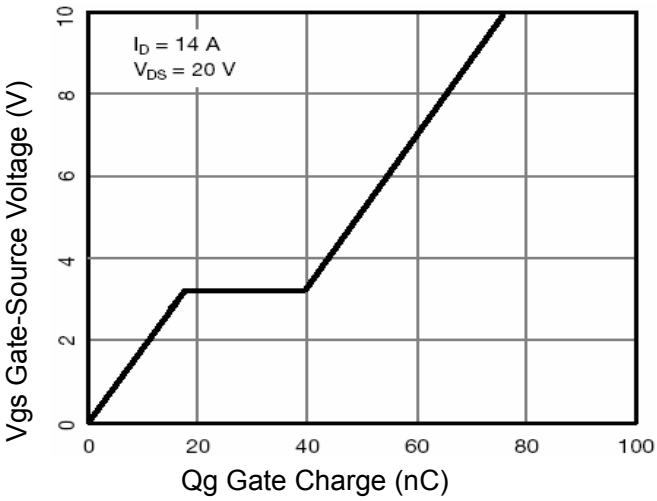


Figure 5 Gate Charge

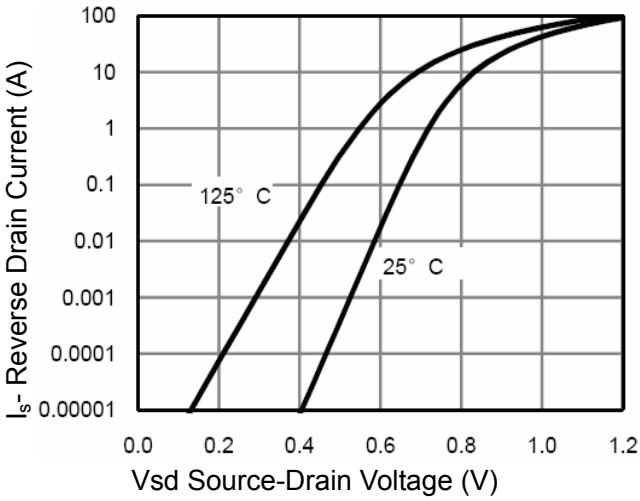


Figure 6 Source- Drain Diode Forward

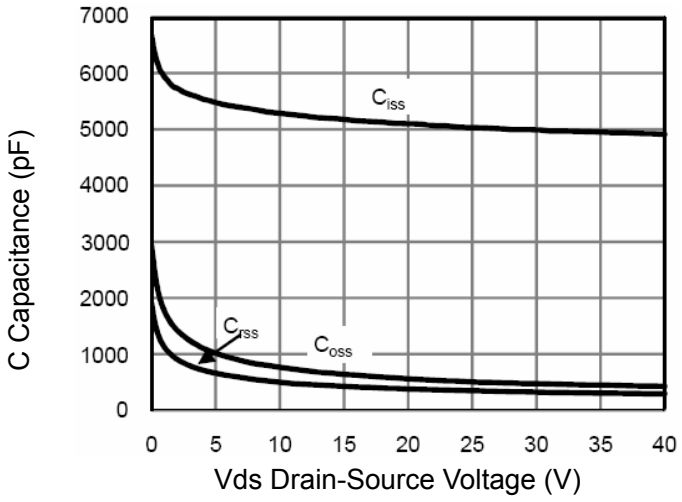


Figure 7 Capacitance vs Vds

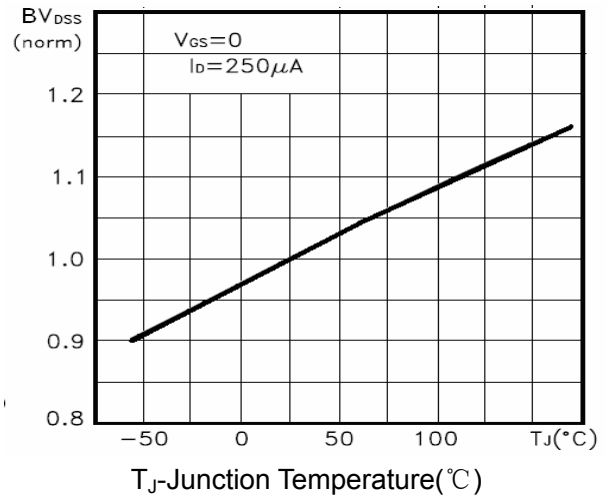


Figure 9 BV_{DSS} vs Junction Temperature

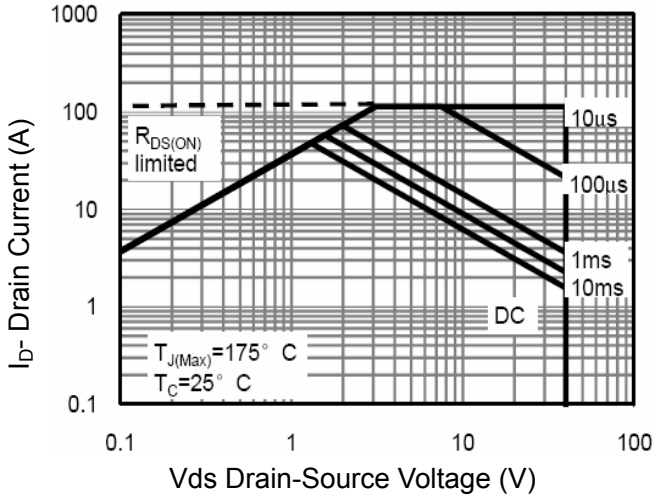


Figure 8 Safe Operation Area

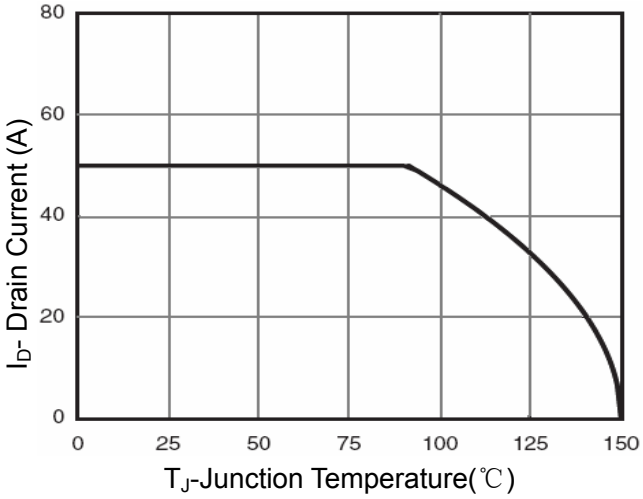


Figure 10 ID Current Derating vs Junction Temperature

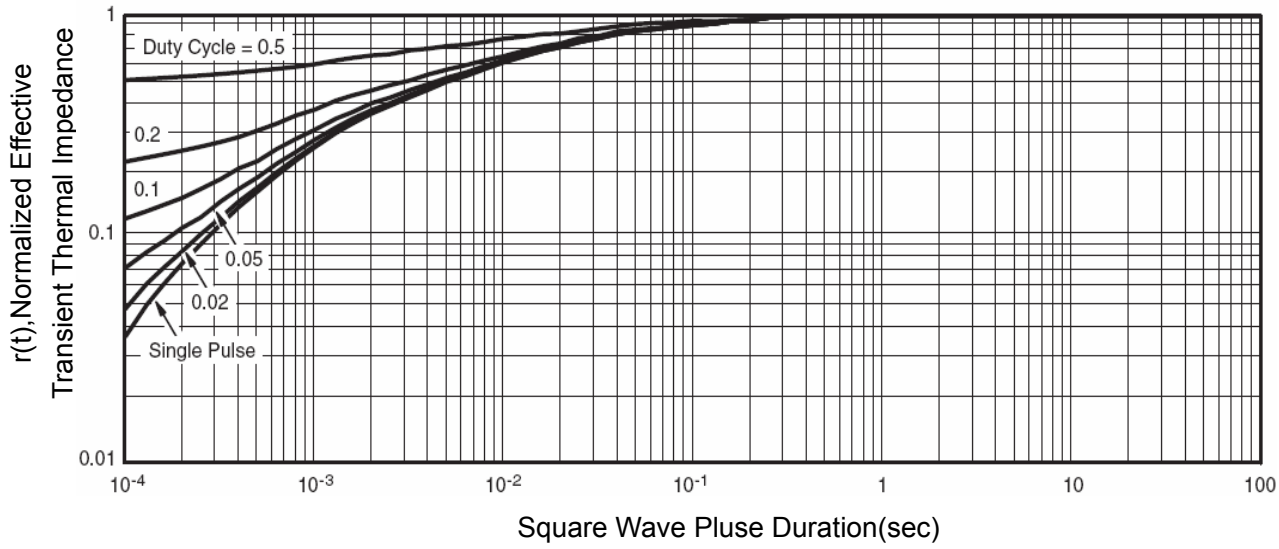


Figure 11 Normalized Maximum Transient Thermal Impedance

Micro Commercial Components

Ordering Information :

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

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