

Features

- Low R_{DSon}
- Low Gate Charge
- Split Gate Trench Power MV MOSFET technology
- Epoxy Meets UL 94 V-0 Flammability Rating
- Moisture Sensitivity Level 1
- Halogen Free Available Upon Request By Adding Suffix "-HF"
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

N-CHANNEL MOSFET

Maximum Ratings

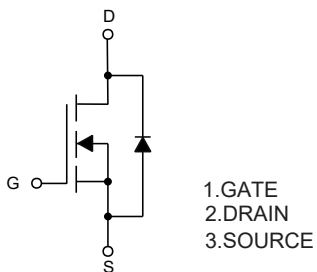
- Operating Junction Temperature Range: -55°C to $+150^{\circ}\text{C}$
- Storage Temperature Range: -55°C to $+150^{\circ}\text{C}$
- Thermal Resistance: 2.15°C/W Junction to Case

Parameter	Symbol	Rating	Unit
Drain -Source Voltage	V_{DS}	40	V
Gate -Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	60	A
Drain Current-Pulsed	I_{DM}	240	A
Power Dissipation	P_D	70	W
Single Pulsed Avalanche Energy ^(Note1)	E_{AS}	400	mJ

DPAK

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		TYP.
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		TYP.
L	0.055	0.067	1.40	1.70	
M	0.063		1.60		TYP.
O	0.043	0.051	1.10	1.30	
Q	0.000	0.012	0.00	0.30	
V	0.211		5.35		TYP.

Internal Structure



Marking: MCU60N04A

ELECTRICAL CHARACTERISTICS (Ta=25°C unless otherwise specified)

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	40			V
Gate-Threshold Voltage ^(Note2)	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.9	1.3	2.0	V
Gate-Body Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 40V, V_{GS} = 0V$			1	μA
Drain-Source On-Resistance ^(Note2)	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$		5.4	7.0	m Ω
		$V_{GS}=4.5V, I_D=20A$		6.8	9.6	
Forward Transconductance ^(Note2)	g_{FS}	$V_{DS}=25V, I_D=20A$	24			S
Dynamic Characteristics^(Note3)						
Input Capacitance	C_{iss}	$V_{DS}=20V, V_{GS}=0V, f=1MHz$		1650		pF
Output Capacitance	C_{oss}			240		
Reverse Transfer Capacitance	C_{rss}			170		
Switching Characteristics^(Note3)						
Total Gate Charge	Q_g	$V_{DS}=20V, V_{GS}=10V, I_D=20A$		27		nC
Gate-Source Charge	Q_{gs}			4.2		
Gate-Drain Charge	Q_{gd}			6.0		
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=20V, V_{GS}=10V, R_G=3\Omega, I_D=2A, R_L=1\Omega,$		6.7		ns
Turn-on Rise Time	t_r			17.8		
Turn-off Delay Time	$t_{d(off)}$			26.3		
Turn-off Fall Time	t_f			15.6		
Drain-Source Diode Characteristics						
Drain-Source Diode Forward Voltage ^(Note 2)	V_{SD}	$V_{GS}=0V, I_S=20A$			1.2	V
Continuous Drain-Source Diode Forward Current	I_S				60	A
Pulsed Drain-Source Diode Forward Current	I_{SM}				240	A

Notes:

1. E_{AS} Condition: $V_{DD}=50V, V_G=10V, R_G=25\Omega$, Starting $T_J = 25^\circ C$
2. Pulse Test : Pulse Width $\leq 300\mu s$, duty cycle $\leq 2\%$.
3. Guaranteed by Design, Not Subject to Production.

Curve Characteristics

Fig. 1 - Output Characteristics

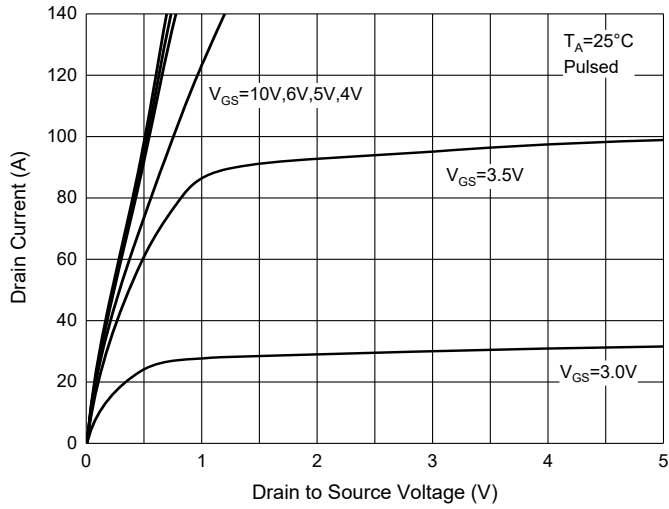


Fig. 2 - Transfer Characteristics

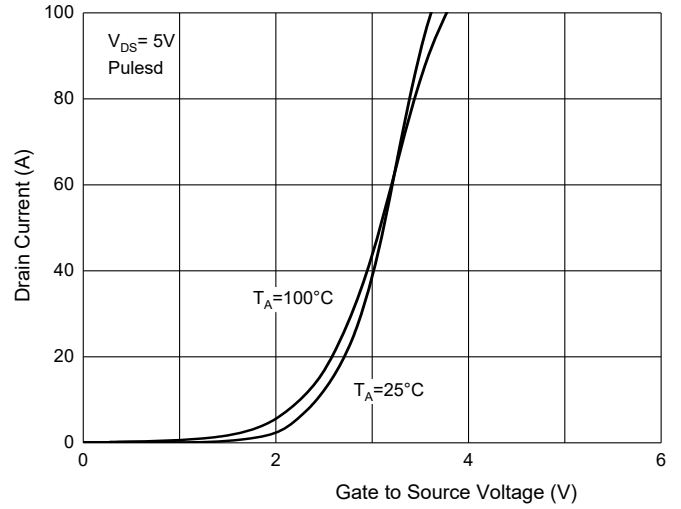


Fig. 3 - $R_{DS(ON)} - I_D$

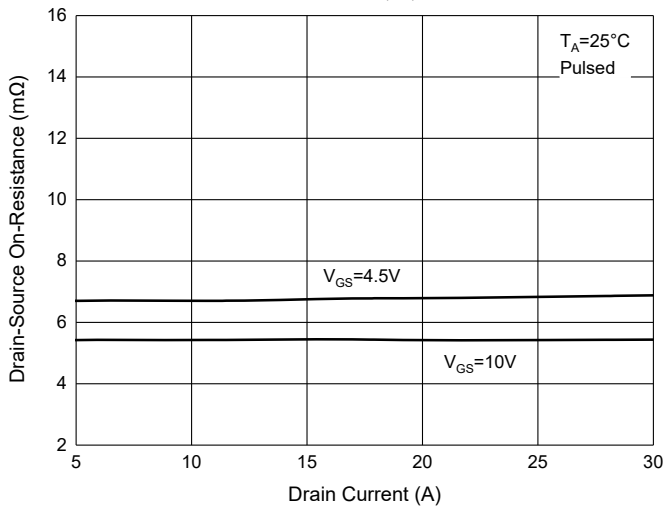


Fig. 4 - $R_{DS(ON)} - V_{GS}$

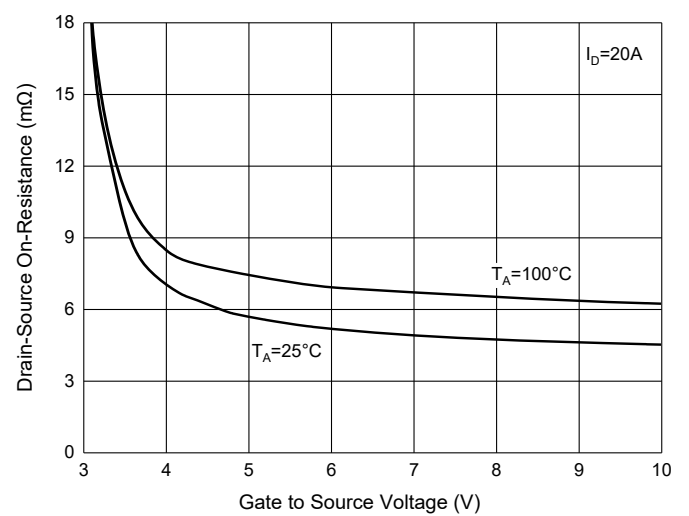


Fig. 5 - $I_S - V_{SD}$

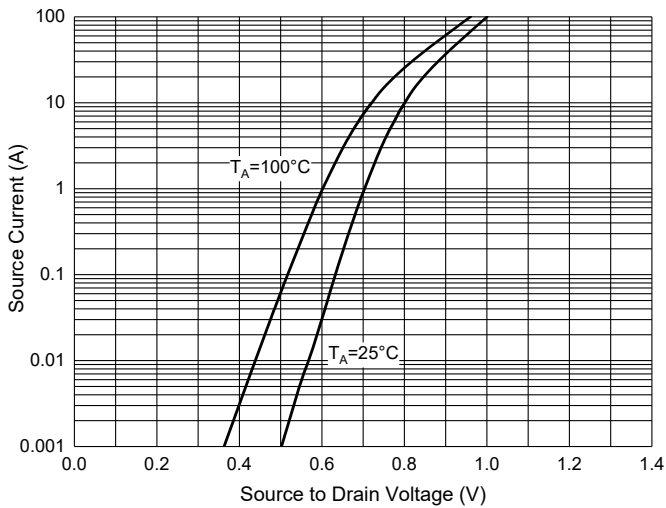
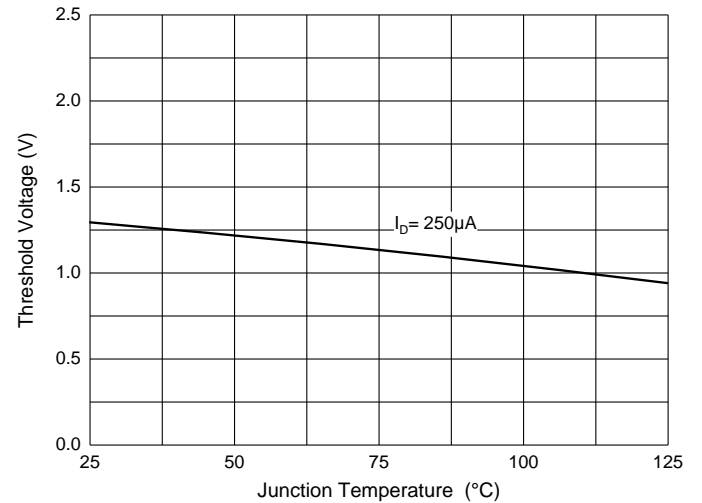


Fig. 6 - Threshold Voltage



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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