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Micro Commercial Components



Micro Commercial Components  
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# MCMNP517

## N and P-Channel Enhancement Mode Field Effect Transistor

### Features

- Halogen free available upon request by adding suffix "-HF"
- Super High Density Cell Design for Extremely Low  $R_{DS(ON)}$
- Lead Free Finish/Rohs Compliant ("P" Suffix designates RoHS Compliant. See ordering information)
- Epoxy meets UL 94 V-0 flammability rating
- Moisture Sensitivity Level 1
- Marking:517

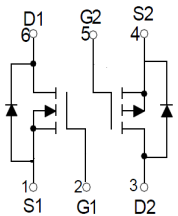
### Maximum ratings ( $T_a=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	$V_{DS}$	12	-12	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	$\pm 12$	V
Continuous Drain Current (NOTE1)	$I_D$	6.0	-4.1	A
Pulsed Drain Current	$I_{DM}$	24	-16.4	A
Continous Source-Drain Diode Current	$I_S$	6	-4.1	A
Thermal Resistance from Junction to Ambient (NOTE1)	$R_{\theta JA}$	167		$^{\circ}C/W$
Operating Junction Temperature	$T_J$	150		$^{\circ}C$
Storage Temperature	$T_{STG}$	-55 ~ +150		$^{\circ}C$

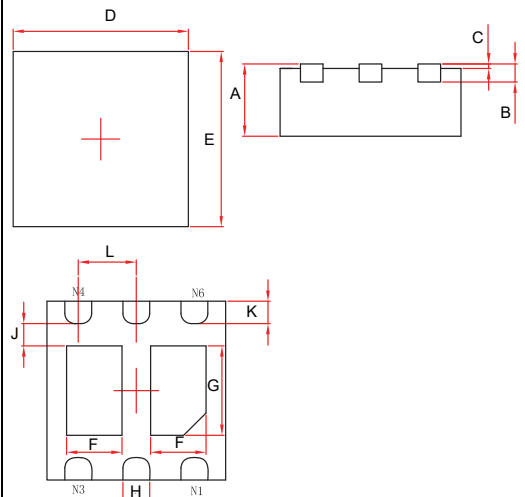
### Notes :

1. Surface mounted on FR4 board using the minimum recommended pad size.

### Equivalent Circuit



### DFN2020-6U



DIM	Dimensions				NOTE
	INCHES		MM		
	MIN	MAX	MIN	MAX	
A	0.028	.035	0.700	0.900	
B	0.008REF.		0.203REF.		
C	0.000	0.002	0.000	0.050	
D	0.076	0.082	1.924	2.076	
E	0.076	0.082	1.924	2.076	
F	0.020	0.028	0.520	0.720	
G	0.035	0.043	0.900	1.100	
H	0.010	0.014	0.250	0.350	
J	0.008	---	0.200	---	
K	0.007	0.013	0.174	0.326	
L	0.026TYP.		0.650TYP.		

## MOSFET ELECTRICAL CHARACTERISTICS

### N-ch MOSFET ELECTRICAL CHARACTERISTICS( $T_a=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>STATIC CHARACTERISTICS</b>						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	12			V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 16V, V_{GS} = 0V$			1	$\mu A$
Gate-body leakage current	$I_{GSS}$	$V_{GS} = \pm 12V, V_{DS} = 0V$			$\pm 100$	nA
Gate threshold voltage (note 2)	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	0.5		1	V
Drain-source on-resistance(note 2)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 6A$			24	m $\Omega$
		$V_{GS} = 4.5V, I_D = 5A$			27	m $\Omega$
		$V_{GS} = 2.5V, I_D = 4A$			42	m $\Omega$
		$V_{GS} = 1.8V, I_D = 2A$			74	m $\Omega$
Forward tranconductance(note 2)	$g_{FS}$	$V_{DS} = 5V, I_D = 3.8A$	4			S
Diode forward voltage	$V_{SD}$	$I_S = 1A, V_{GS} = 0V$			1	V
<b>DYNAMIC CHARACTERISTICS (note 4)</b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 10V, V_{GS} = 0V, f = 1MHz$		630		pF
Output Capacitance	$C_{oss}$			164		pF
Reverse Transfer Capacitance	$C_{rss}$			137		pF
<b>SWITCHING CHARACTERISTICS (note 3,4)</b>						
Turn-on delay time	$t_{d(on)}$	$V_{GS} = 5V, V_{DS} = 10V,$ $R_{GEN} = 6\Omega, R_L = 1.7\Omega$		5.5		ns
Turn-on rise time	$t_r$			14		ns
Turn-off delay time	$t_{d(off)}$			29		ns
Turn-off fall time	$t_f$			10.2		ns
Total Gate Charge	$Q_g$	$V_{DS} = 10V, I_D = 6A,$ $V_{GS} = 10V$		12		nC
Gate-Source Charge	$Q_{gs}$			1		nC
Gate-Drain Charge	$Q_{gd}$			2		nC

**P-ch MOSFET ELECTRICAL CHARACTERISTICS(T<sub>a</sub>=25°C unless otherwise noted)**

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>STATIC CHARACTERISTICS</b>						
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA	-12			V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> = -8V, V <sub>GS</sub> = 0V			-1	μA
Gate-body leakage current	I <sub>GSS</sub>	V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V			±100	nA
Gate threshold voltage (note 2)	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA	-0.5		-0.9	V
Drain-source on-resistance(note 2)	R <sub>DS(on)</sub>	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -3.5A			45	mΩ
		V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -3A			60	mΩ
		V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -2A			90	mΩ
Forward tranconductance(note 2)	g <sub>FS</sub>	V <sub>DS</sub> = -5V, I <sub>D</sub> = -4.1A	6			S
Diode forward voltage	V <sub>SD</sub>	I <sub>S</sub> = -3.3A, V <sub>GS</sub> = 0V			-1.2	V
<b>DYNAMIC CHARACTERISTICS (note 4)</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> = -4V, V <sub>GS</sub> = 0V, f = 1MHz		740		pF
Output Capacitance	C <sub>OSS</sub>			290		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			190		pF
<b>SWITCHING CHARACTERISTICS (note 3,4)</b>						
Turn-on delay time	t <sub>d(on)</sub>	V <sub>GEN</sub> = -4.5V, V <sub>DD</sub> = -4V, I <sub>D</sub> = -3.3A, R <sub>G</sub> = 1Ω , R <sub>L</sub> = 1.2Ω			20	ns
Turn-on rise time	t <sub>r</sub>				53	ns
Turn-off delay time	t <sub>d(off)</sub>				48	ns
Turn-off fall time	t <sub>f</sub>				20	ns
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = -4V, I <sub>D</sub> = -4.1A, V <sub>GS</sub> = -2.5V			9	nC
Gate-Source Charge	Q <sub>gs</sub>			1.2		nC
Gate-Drain Charge	Q <sub>gd</sub>			1.6		nC

**Notes :**

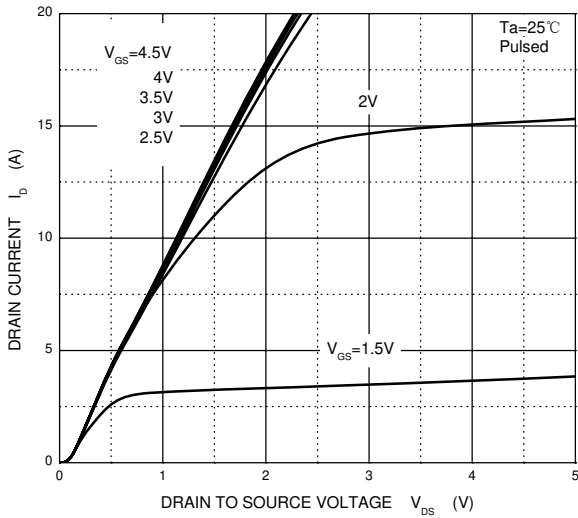
- Pulse Test: Pulse width = 300μs, duty cycle ≤ 2%.
- Switching characteristics are independent of operating junction temperature.
- Garanted by design, not subject to producing.



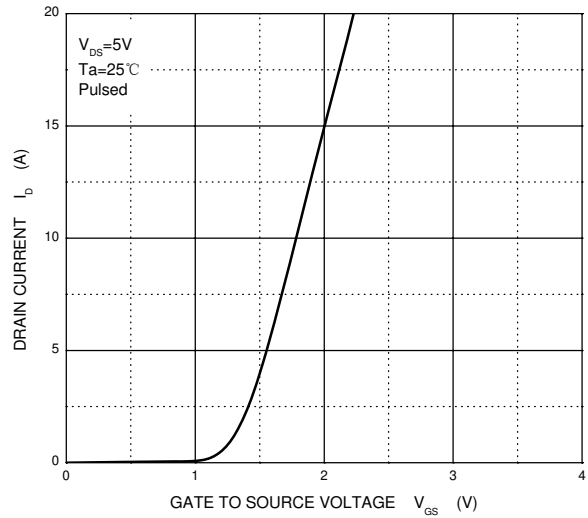
# Typical Characteristics

## N-Channel MOS

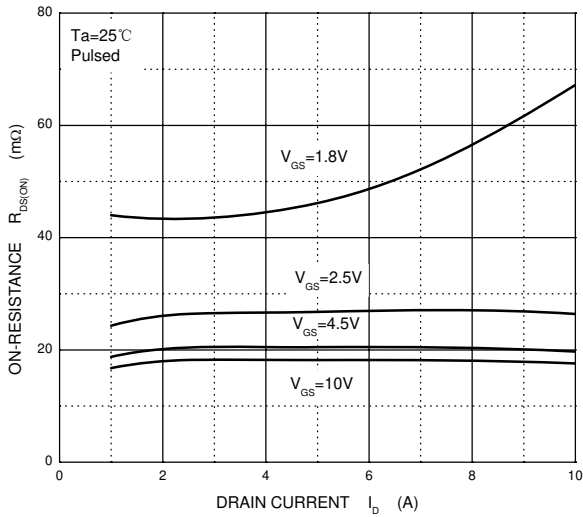
**Output Characteristics**



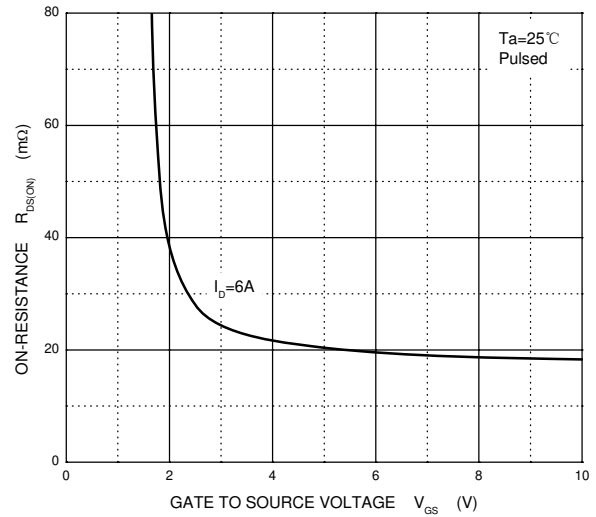
**Transfer Characteristics**



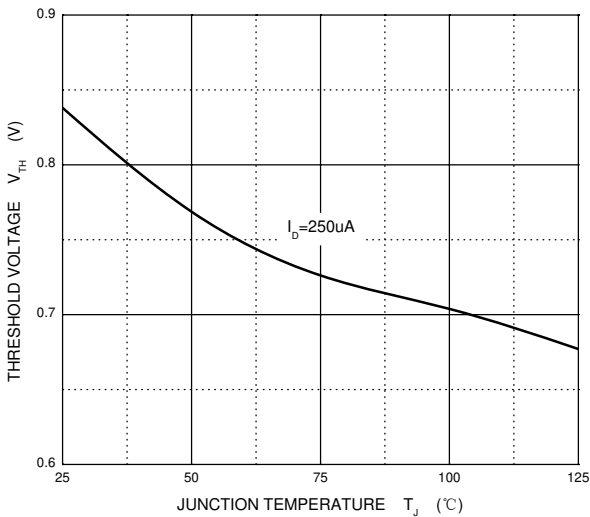
**$R_{DS(ON)}$  —  $I_D$**



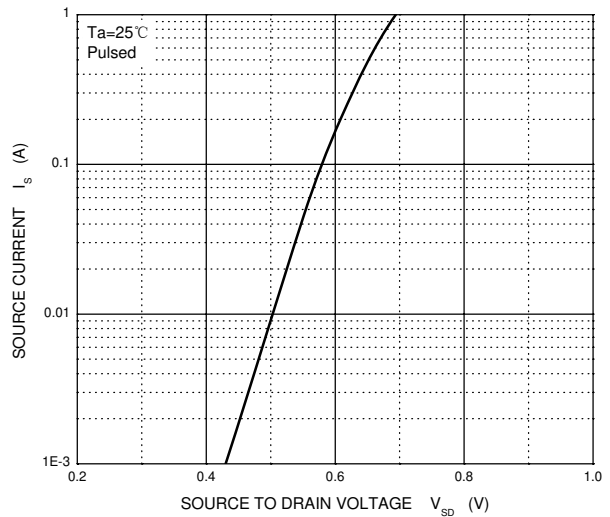
**$R_{DS(ON)}$  —  $V_{GS}$**



**Threshold Voltage**



**$I_S$  —  $V_{SD}$**



# Typical Characteristics

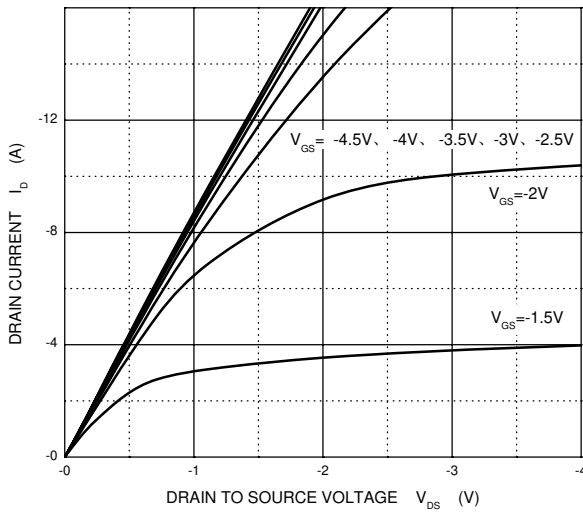
## P-Channel MOS

-16

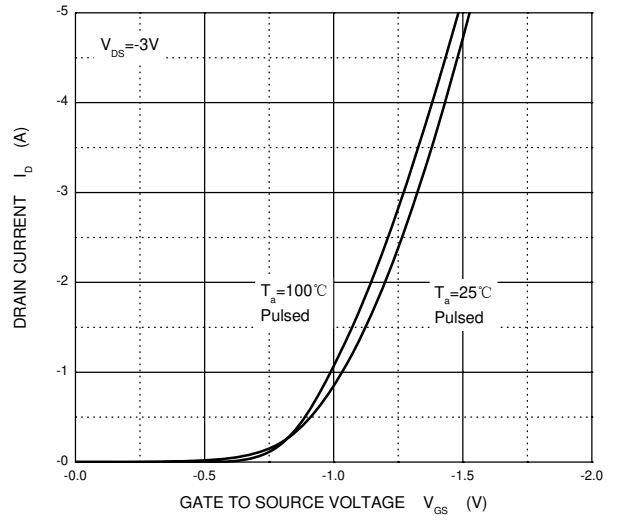


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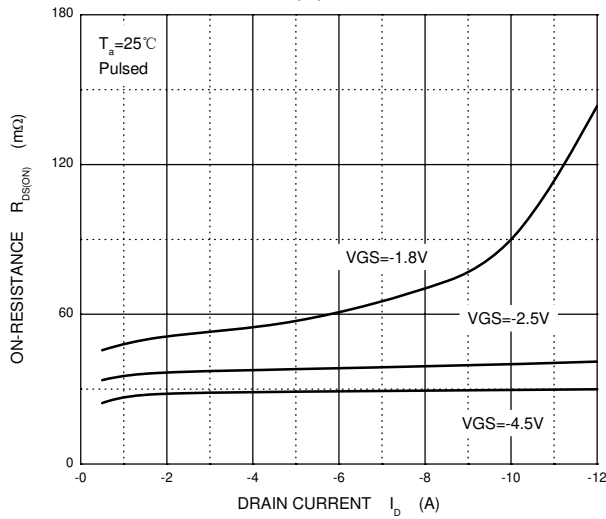
Output Characteristics



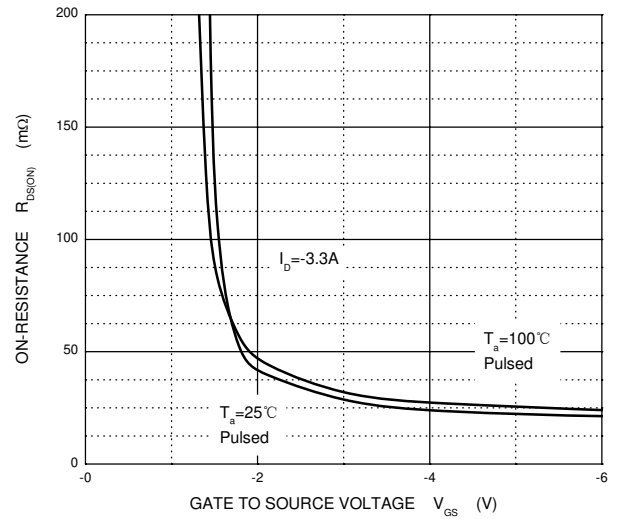
Transfer Characteristics



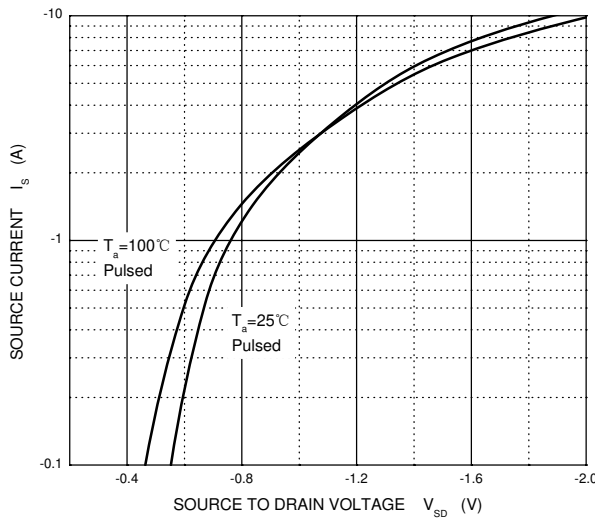
$R_{DS(ON)}$  —  $I_D$



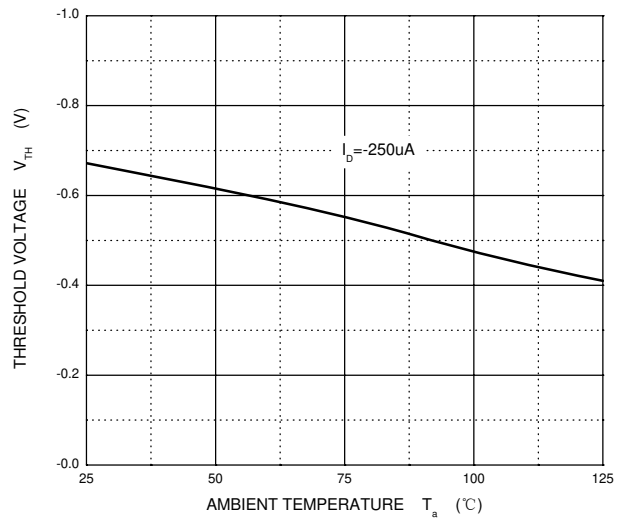
$R_{DS(ON)}$  —  $V_{GS}$



$I_S$  —  $V_{SD}$



Threshold Voltage





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Ordering Information :

Device	Packing
Part Number-TP	Tape&Reel:3.0Kpcs/Reel

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

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