



# STM4470

SamHop Microelectronics Corp.

Oct. 16. 2006 Ver1.1

## N-Channel Enhancement Mode Field Effect Transistor

PRODUCT SUMMARY		
$V_{DS}^d$	$I_D$	$R_{DS(ON)}$ ( m $\Omega$ ) Max
40V	10A	10 @ $V_{GS} = 10V$
		13 @ $V_{GS} = 4.5V$

### FEATURES

- Super high dense cell design for low  $R_{DS(ON)}$ .
- Rugged and reliable.
- Surface Mount Package.



### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}^d$	40	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous <sup>a</sup> @ $T_J=25^\circ C$ -Pulsed <sup>b</sup>	$I_D$	10	A
	$I_{DM}$	39	A
Drain-Source Diode Forward Current <sup>a</sup>	$I_S$	1.7	A
Maximum Power Dissipation <sup>a</sup>	PD	2.5	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ C$

### THERMAL CHARACTERISTICS

Thermal Resistance, Junction-to-Ambient <sup>a</sup>	$R_{\theta A}$	50	$^\circ C/W$
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ELECTRICAL CHARACTERISTICS (TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ <sup>c</sup>	Max	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage <sup>d</sup>	BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250uA	40			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 32V, V <sub>GS</sub> = 0V			1	uA
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V			±100	nA
<b>ON CHARACTERISTICS<sup>b</sup></b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250uA	1	1.7	3	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 10A		8	10	m ohm
		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 6A		11	13	m ohm
On-State Drain Current	I <sub>D(ON)</sub>	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 10V	20			A
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = 10V, I <sub>D</sub> = 10A		20		S
<b>DYNAMIC CHARACTERISTICS<sup>c</sup></b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V f = 1.0MHz		1020		pF
Output Capacitance	C <sub>OSS</sub>			240		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			135		pF
<b>SWITCHING CHARACTERISTICS<sup>c</sup></b>						
Turn-On Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> = 20V I <sub>D</sub> = 1A V <sub>GS</sub> = 10V R <sub>GEN</sub> = 3.3 ohm		15		ns
Rise Time	t			22		ns
Turn-Off Delay Time	t <sub>D(OFF)</sub>			48		ns
Fall Time	t			12		ns
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 20V, I <sub>D</sub> = 10A, V <sub>GS</sub> = 10V		19.5		nC
		V <sub>DS</sub> = 20V, I <sub>D</sub> = 10A, V <sub>GS</sub> = 4.5V		9.8		nC
Gate-Source Charge	Q <sub>gs</sub>	V <sub>DS</sub> = 20V, I <sub>D</sub> = 10A		2		nC
Gate-Drain Charge	Q <sub>gd</sub>	V <sub>GS</sub> = 10V		5.5		nC

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## ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ <sup>c</sup>	Max	Unit
DRAIN-SOURCE DIODE CHARACTERISTICS <sup>b</sup>						
Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0V, I_S = 1.7A$		0.73	1.2	V

### Notes

- a. Surface Mounted on FR4 Board,  $t \leq 10\text{sec}$ .
- b. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .
- c. Guaranteed by design, not subject to production testing.
- d. Guaranteed when external  $R_g = 3.3\ \Omega$  and  $t_f < t_{f\text{max}}$

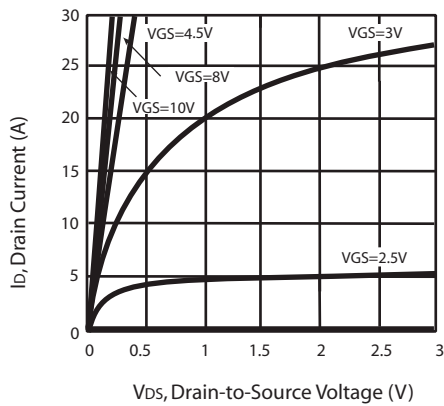


Figure 1. Output Characteristics

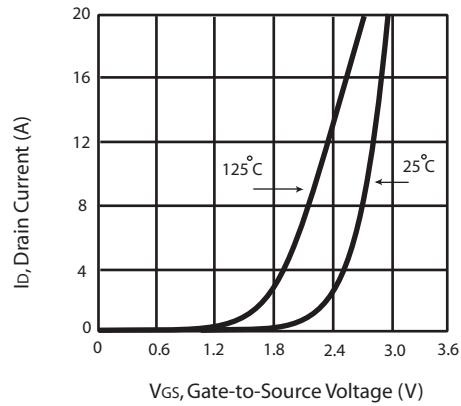


Figure 2. Transfer Characteristics

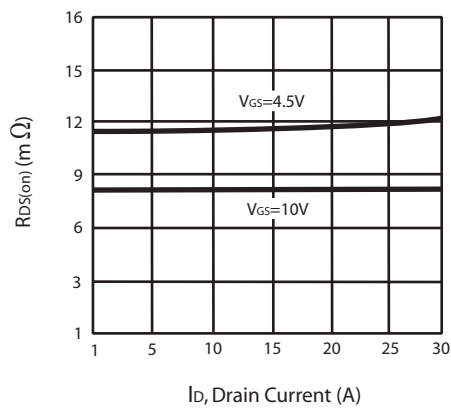


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

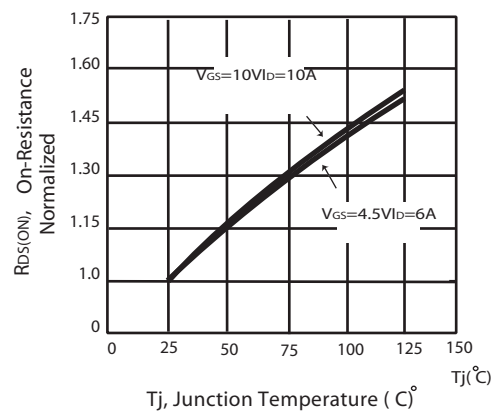


Figure 4. On-Resistance Variation with Drain Current and Temperature

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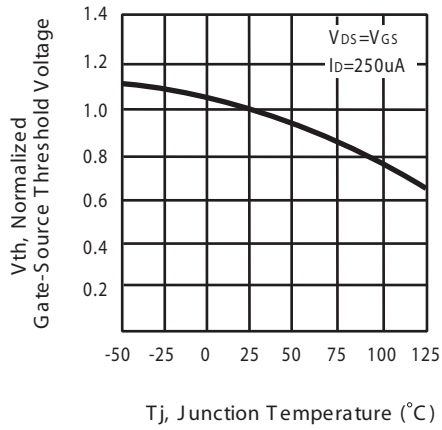


Figure 5. Gate Threshold Variation with Temperature

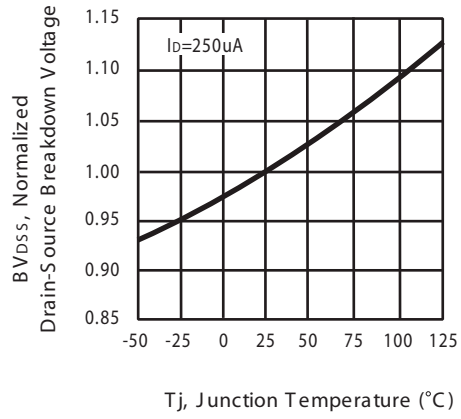


Figure 6. Breakdown Voltage Variation with Temperature

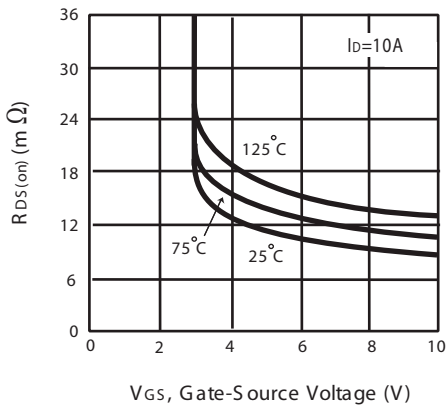


Figure 7. On-Resistance vs. Gate-Source Voltage

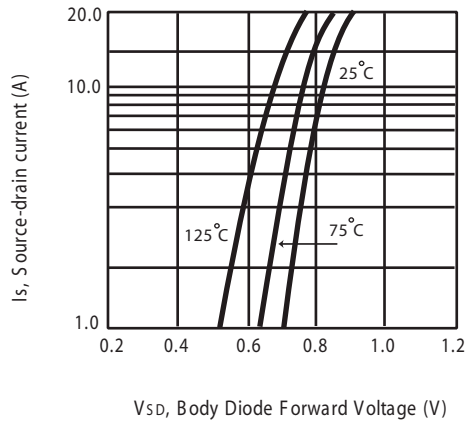


Figure 8. Body Diode Forward Voltage Variation with Source Current

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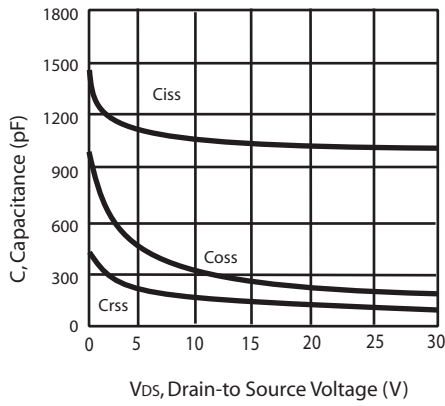


Figure 9. Capacitance

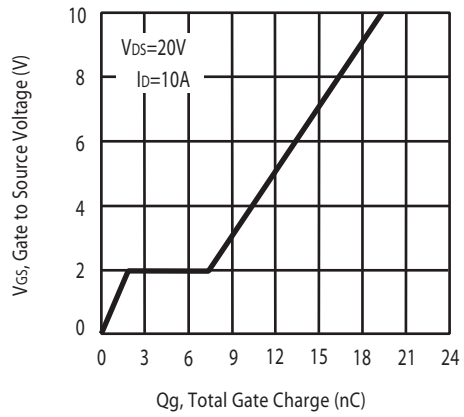


Figure 10. Gate Charge

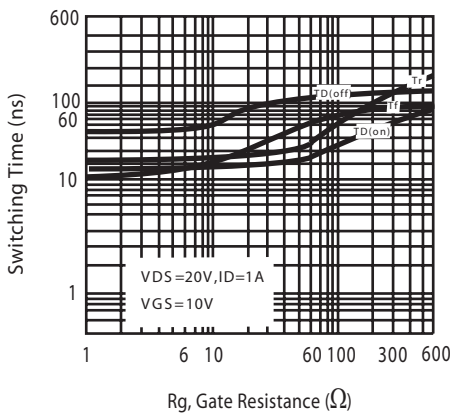


Figure 11. switching characteristics

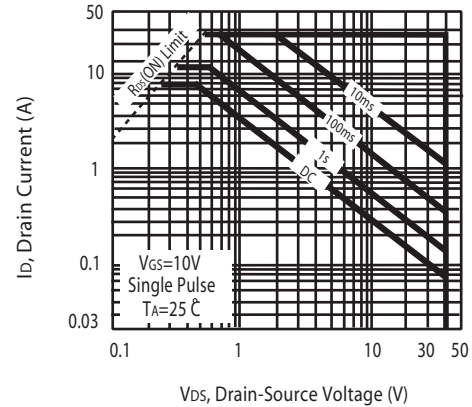
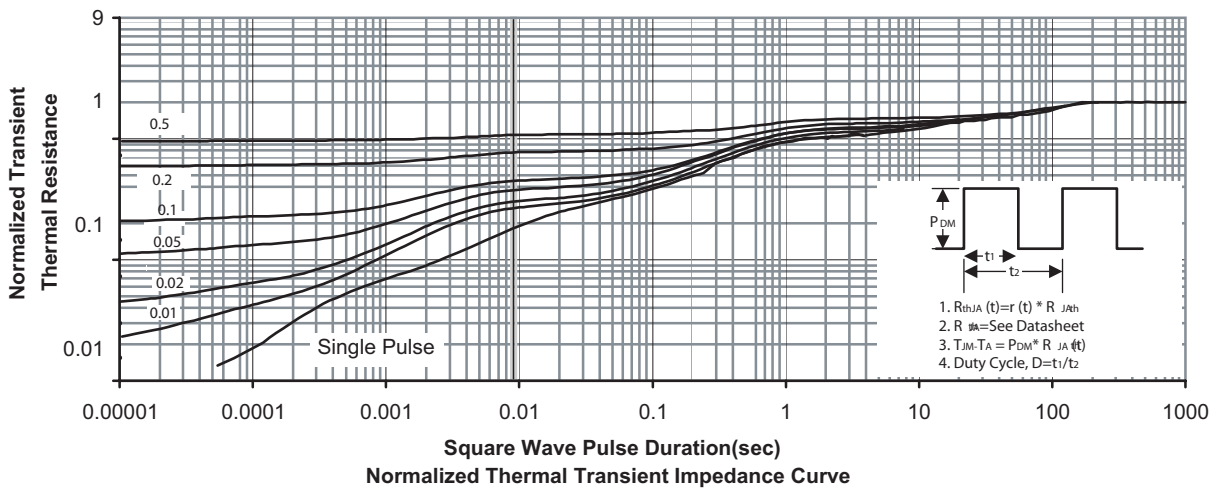


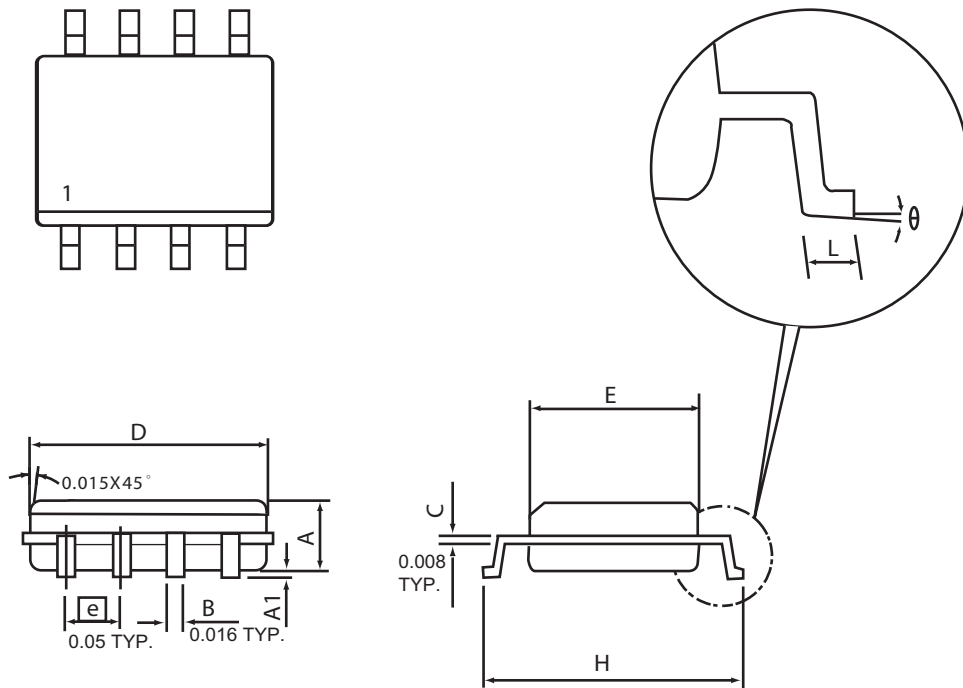
Figure 12. Maximum Safe Operating Area



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## PACKAGE OUTLINE DIMENSIONS

SO-8

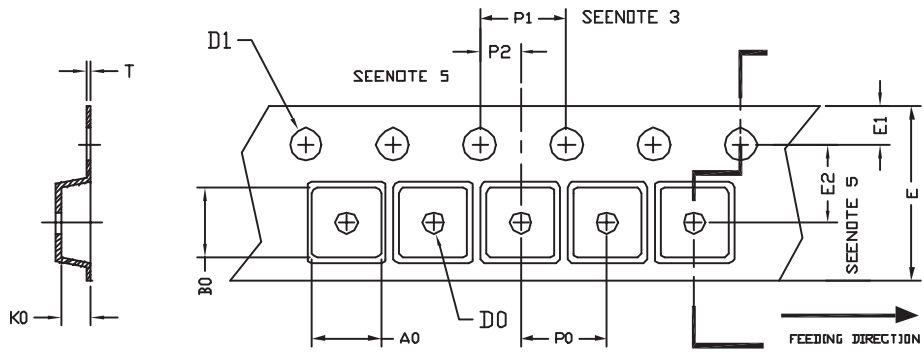


SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
D	4.80	4.98	0.189	0.196
E	3.81	3.99	0.150	0.157
H	5.79	6.20	0.228	0.244
L	0.41	1.27	0.016	0.050
$\theta$	0°	8°	0°	8°

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## SO-8 Tape and Reel Data

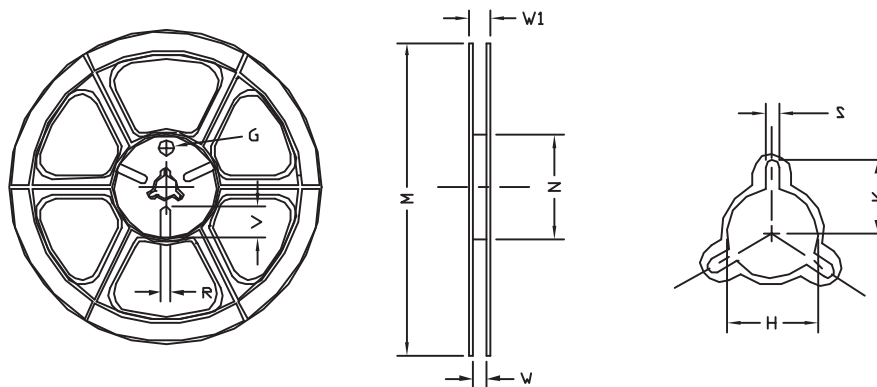
### SO-8 Carrier Tape



unit:mm

PACKAGE	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
SOP 8N 150mil	6.40	5.20	2.10	$\phi 1.5$ (MIN)	$\phi 1.5$ + 0.1 - 0.0	12.0 $\pm 0.3$	1.75	5.5 $\pm 0.05$	8.0	4.0	2.0 $\pm 0.05$	0.3 $\pm 0.05$

### SO-8 Reel



UNIT:mm

TAPE SIZE	REEL SIZE	M	N	W	W1	H	K	S	G	R	V
12 mm	$\phi 330$	330 $\pm 1$	62 $\pm 1.5$	12.4 + 0.2	16.8 - 0.4	$\phi 12.75$ + 0.15	---	2.0 $\pm 0.15$	---	---	---