



## N-Channel Enhancement Mode Field Effect Transistor

### PRODUCT SUMMARY

V <sub>DSS</sub>	I <sub>D</sub>	R <sub>DS(ON)</sub> (mΩ) Max
40V	12A	11 @ V <sub>GS</sub> =10V
		15 @ V <sub>GS</sub> =4.5V

### FEATURES

- Super high dense cell design for low R<sub>DS(ON)</sub>.
- Rugged and reliable.
- Surface Mount Package.



### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub>=25°C unless otherwise noted)

Symbol	Parameter	Limit	Units
V <sub>DS</sub>	Drain-Source Voltage	40	V
V <sub>GS</sub>	Gate-Source Voltage	±20	V
I <sub>D</sub>	Drain Current-Continuous <sup>a</sup>	T <sub>A</sub> =25°C	12
		T <sub>A</sub> =70°C	9.6
I <sub>DM</sub>	-Pulsed <sup>b</sup>	60	A
E <sub>AS</sub>	Single Pulse Avalanche Energy <sup>d</sup>	121	mJ
P <sub>D</sub>	Maximum Power Dissipation <sup>a</sup>	T <sub>A</sub> =25°C	2.5
		T <sub>A</sub> =70°C	1.6
T <sub>J</sub> , T <sub>STG</sub>	Operating Junction and Storage Temperature Range	-55 to 150	°C

### THERMAL CHARACTERISTICS

R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient <sup>a</sup>	50	°C/W
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# STM4432

Ver 1.0

## ELECTRICAL CHARACTERISTICS (TA=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>OFF CHARACTERISTICS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	40			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =32V, V <sub>GS</sub> =0V			1	uA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> = ±20V, V <sub>DS</sub> =0V			±100	nA
<b>ON CHARACTERISTICS</b>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	1	1.7	3	V
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =12A		9	11	m ohm
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A		12	15	m ohm
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =10V, I <sub>D</sub> =12A		25		S
<b>DYNAMIC CHARACTERISTICS <sup>c</sup></b>						
C <sub>ISS</sub>	Input Capacitance	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V f=1.0MHz		1375		pF
C <sub>OSS</sub>	Output Capacitance			220		pF
C <sub>RSS</sub>	Reverse Transfer Capacitance			170		pF
<b>SWITCHING CHARACTERISTICS <sup>c</sup></b>						
t <sub>D(ON)</sub>	Turn-On Delay Time	V <sub>DD</sub> =20V I <sub>D</sub> =1A V <sub>GS</sub> =10V R <sub>GEN</sub> =6 ohm		25		ns
t <sub>r</sub>	Rise Time			31		ns
t <sub>D(OFF)</sub>	Turn-Off Delay Time			63		ns
t <sub>f</sub>	Fall Time			19		ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =20V, I <sub>D</sub> =12A, V <sub>GS</sub> =10V		27		nC
		V <sub>DS</sub> =20V, I <sub>D</sub> =12A, V <sub>GS</sub> =4.5V		13		nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DS</sub> =20V, I <sub>D</sub> =12A, V <sub>GS</sub> =10V		3.5		nC
Q <sub>gd</sub>	Gate-Drain Charge			6.5		nC
<b>DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS</b>						
I <sub>S</sub>	Maximum Continuous Drain-Source Diode Forward Current				2	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =2A		0.76	1.3	V

### Notes

- Surface Mounted on FR4 Board, t ≤ 10sec.
- Pulse Test: Pulse Width ≤ 300us, Duty Cycle ≤ 2%.
- Guaranteed by design, not subject to production testing.
- Starting T<sub>J</sub>=25°C, L=0.5mH, V<sub>DD</sub>=20V. (See Figure 13)

Nov,03,2010

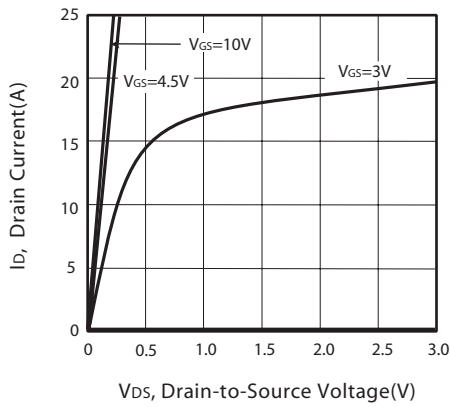


Figure 1. Output Characteristics

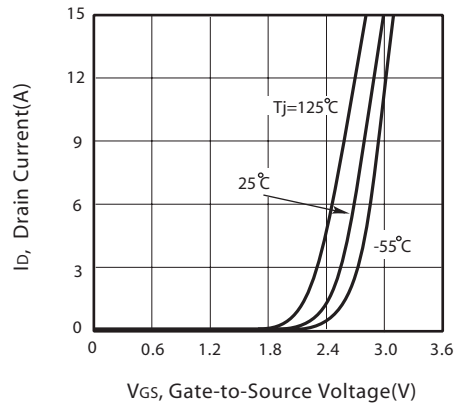


Figure 2. Transfer Characteristics

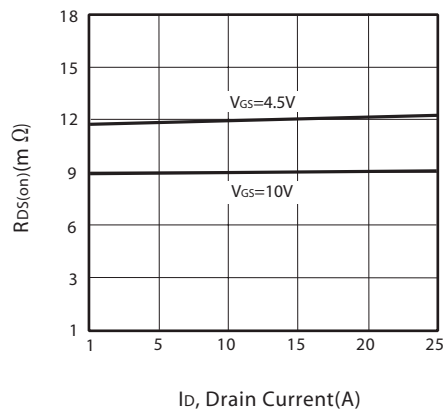


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

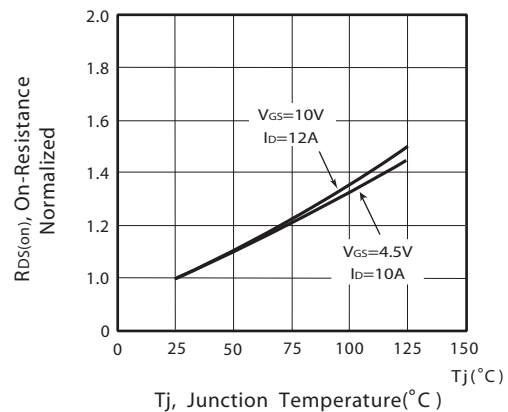


Figure 4. On-Resistance Variation with Drain Current and Temperature

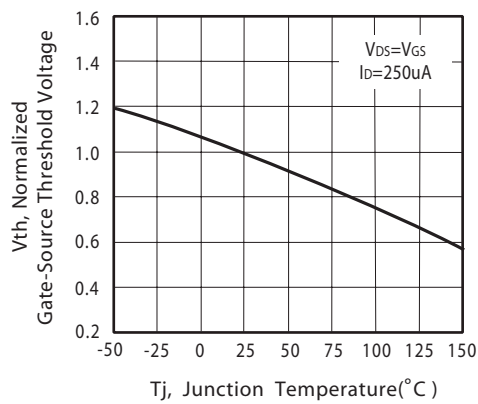


Figure 5. Gate Threshold Variation with Temperature

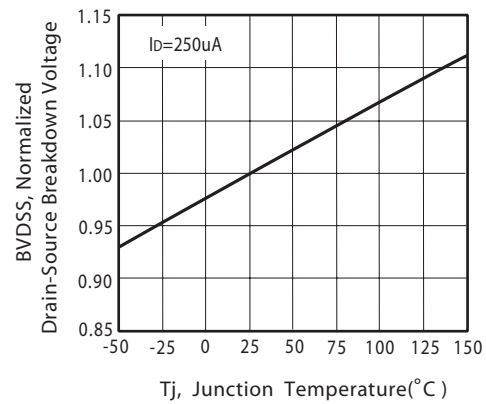


Figure 6. Breakdown Voltage Variation with Temperature

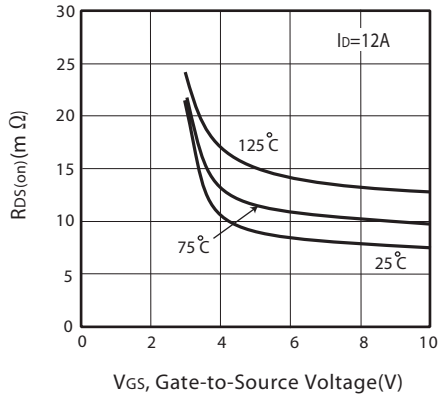


Figure 7. On-Resistance vs. Gate-Source Voltage

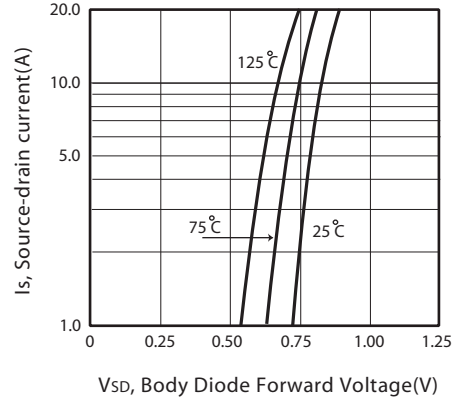


Figure 8. Body Diode Forward Voltage Variation with Source Current

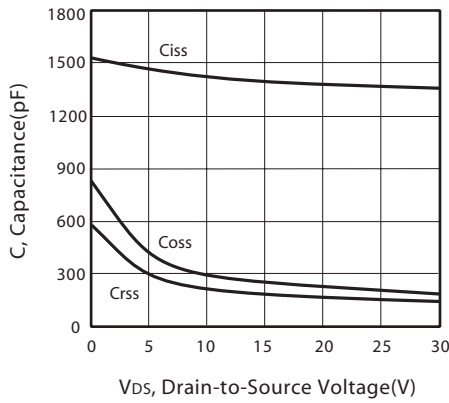


Figure 9. Capacitance

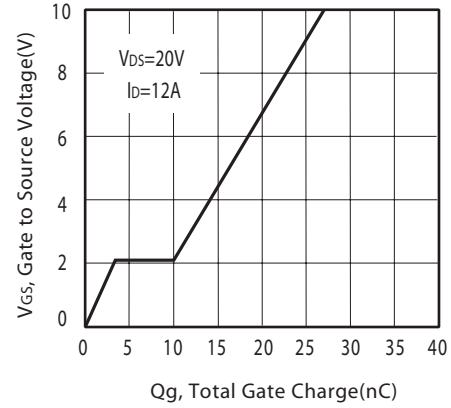


Figure 10. Gate Charge

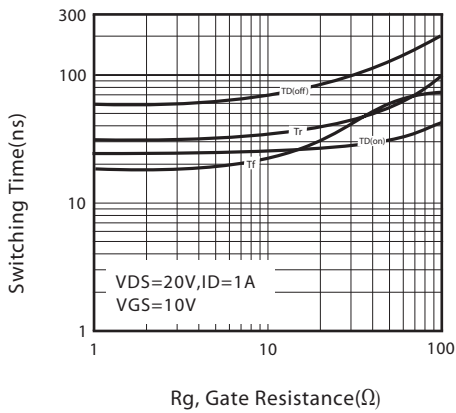


Figure 11. switching characteristics

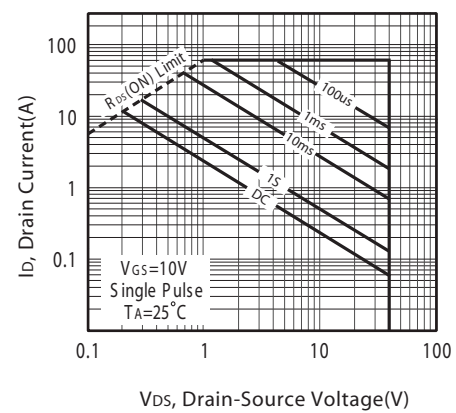
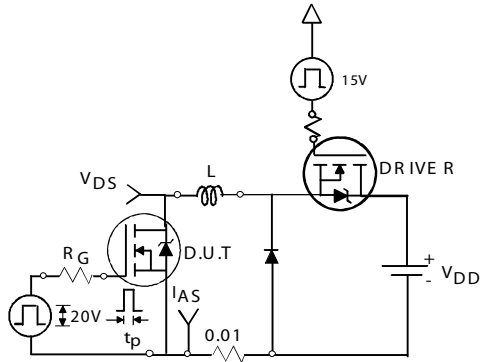
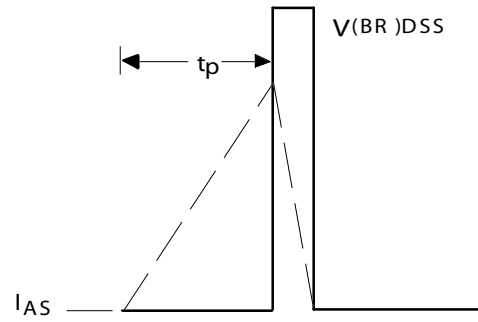


Figure 12. Maximum Safe Operating Area



Unclamped Inductive Test Circuit

Figure 13a.



Unclamped Inductive Waveforms

Figure 13b.

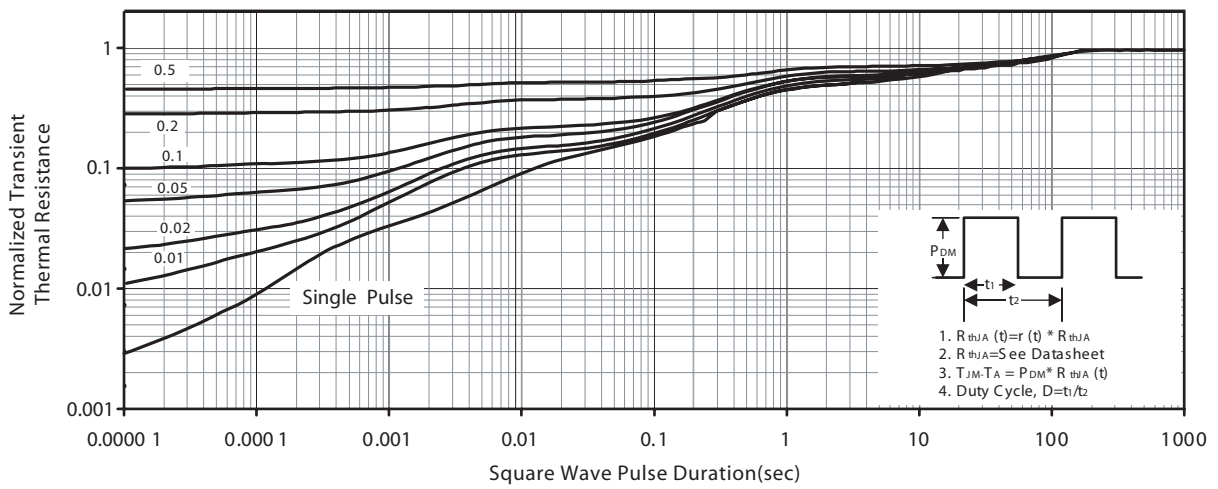
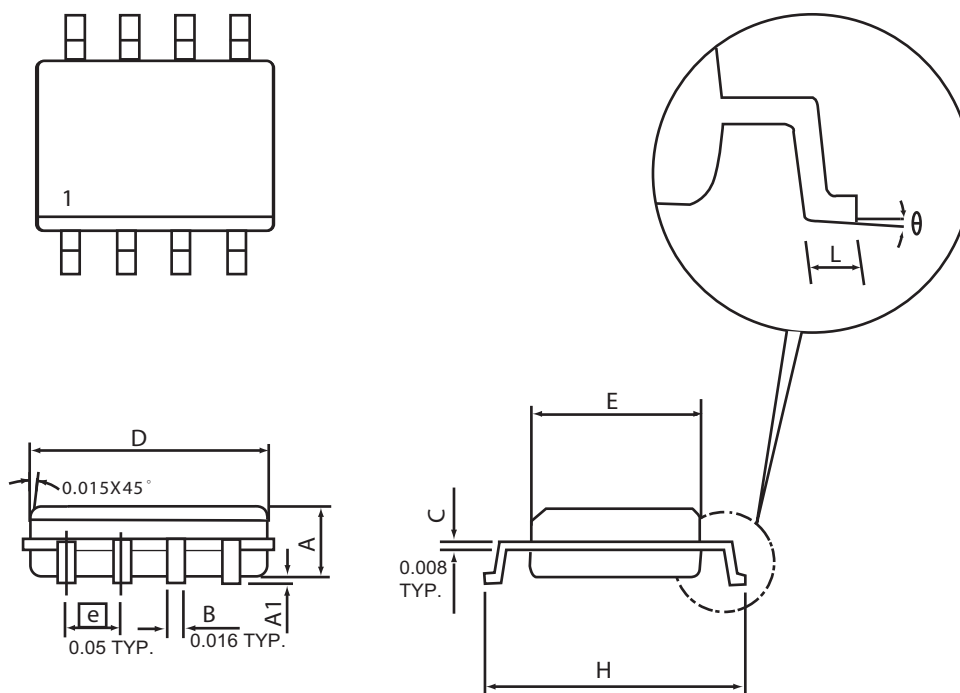


Figure 14. Normalized Thermal Transient Impedance Curve

## PACKAGE OUTLINE DIMENSIONS

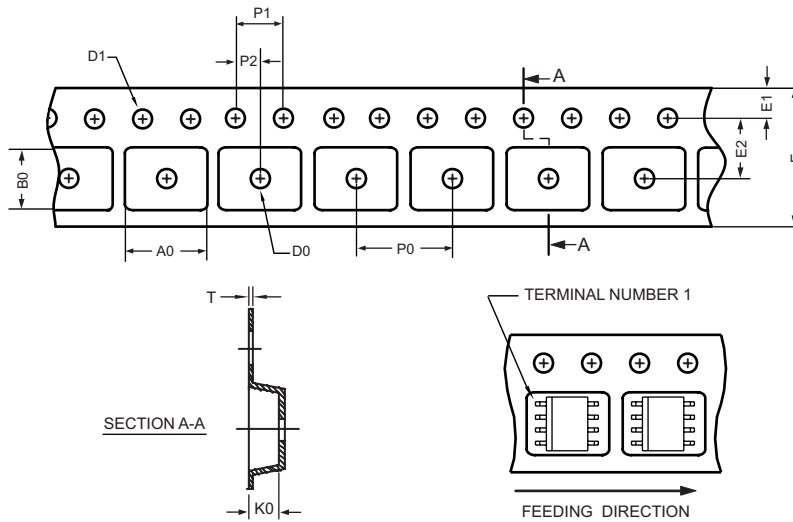
SO-8



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°

## SO-8 Tape and Reel Data

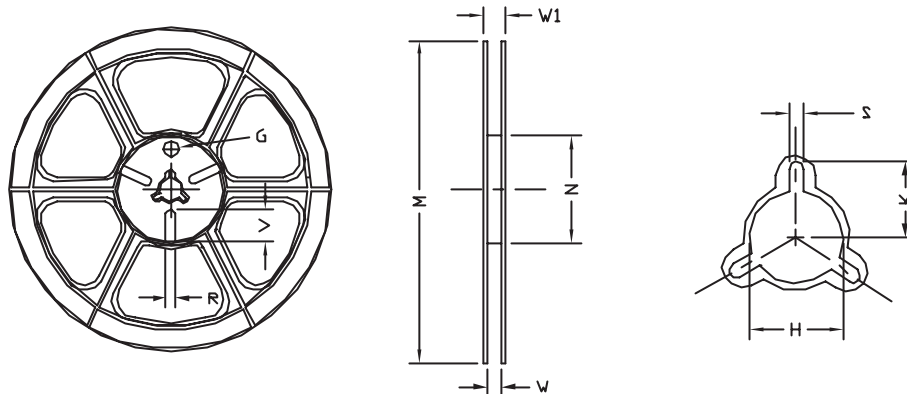
### SO-8 Carrier Tape



unit:mm

PACKAGE	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
SOP 8N 150mil	6.50 ±0.15	5.25 ±0.10	2.10 ±0.10	φ 1.5 (MIN)	φ 1.55 ±0.10	12.0 +0.3 -0.1	1.75 ±0.10	5.5 ±0.10	8.0 ±0.10	4.0 ±0.10	2.0 ±0.10	0.30 ±0.013

### SO-8 Reel



UNIT:mm

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