4406A

30V N-Channel Enhancement Mode MOSFET

■ *DESCRIPTION*

The 4406A is the N-Channel logic enhancement mode power field effect transistor is produced using high cell density advanced trench technology..

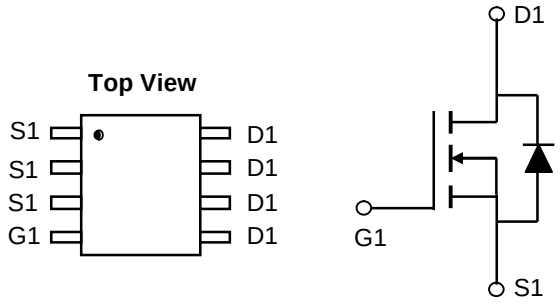
This high density process is especially tailored to minimize on-state resistance. These devices are particularly suited for low voltage application, notebook computer power management and other battery powered circuits where high-side switching

■ *APPLICATIONS*

- Power Management
- Portable Equipment
- DC/DC Converter
- Load Switch
- DSC
- LCD Display inverter

■ *FEATURE*

- ***30V/13 A, $R_{DS(ON)}$=7mΩ (typ.)@VGS=10V***
- ***30V/10A, $R_{DS(ON)}$=10mΩ (typ.)@VGS= 4.5V***



Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
4406A	4406A	SOP-8	-	-	-

■ *PART NUMBER INFORMATION*

4406AA-BB C	A= Package Code S: SOP BB=Handing Code TR: Tape&Reel C=Lead Plating Code G: Green Product

■ *ORDERING INFROMATION*

Part Number	Package Code	Package	Shipping
4406A AS-TRG	**S**	**SOP8**	**3000EA / T&R**

※ Year Code : 0~9

※ Week Code : A~Z(1-26); a~z(27~52)

※ G : Green Product. This product is RoHS compliant.

■ *ABSOLUTE MAXIMUM RATINGS (T_A = 25℃ Unless otherwise noted)*

Symbol	Parameter		Typical	Unit
V_{DSS}	Drain-Source Voltage		30	V
V_{GSS}	Gate-Source Voltage		±20	V
I_D	Continuous Drain Current (TJ=150℃)	V_{GS}-10V	13	A
I_{DM}	Pulsed Drain Current		100	A
I_S	Continuous Source Current (Diode Conduction)		4.0	A
P_D	Power Dissipation	T_A=25℃	2.8	W
		T_A=70℃	1.8	
T_J	Operation Junction Temperature		150	℃
T_{STG}	Storage Temperature Range		-55~+150	℃
$R_{\theta JA}$	Thermal Resistance Junction to Ambient		62.5	℃/W

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress rating only and functional device operation is not implied

■ *ELECTRICAL CHARACTERISTICS(T_A=25℃ Unless otherwise noted)*

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Parameters						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D= 250uA	30			V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D= 250uA	1.0		2.0	V
I_{GSS}	Gate Leakage Current	V_{DS}=0V, V_{GS}=±20V			±100	nA
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}= 24V, V_{GS}=0			1	uA
		V_{DS}= 24V, V_{GS}=0 T_J=85℃			30	
$R_{DS(ON)}$	Drain-Source On-Resistance	V_{GS}= 10V, I_D= 13 A		7	11.5	mΩ
		V_{GS}= 4.5V, I_D= 10 A		10	15	
Source-Drain Diode						
V_{SD}	Diode Forward Voltage	I_S= 2.0A, V_{GS}=0V		0.7	1.3	V
Dynamic Parameters						
Q_g	Total Gate Charge	V_{DS}= 15V		11.6		nC
Q_{gs}	Gate-Source Charge	V_{GS}= 10V		2.5		
Q_{gd}	Gate-Drain Charge	I_D= 9.0A		3.9		
C_{iss}	Input Capacitance	V_{DS}= 25V		770		pF
C_{oss}	Output Capacitance	V_{GS}=0V		110		
C_{rss}	Reverse Transfer Capacitance	f=1MHz		90		
$T_{d(on)}$	Turn-On Time	V_{DS}= 15V		5		nS
T_r		R_L=15Ω		3.5		
$T_{d(off)}$	Turn-Off Time	I_D= 1A		19		
T_f		V_{GEN}= 10V R_G=6Ω		3.5		

Note: 1. Pulse test: pulse width<=300uS, duty cycle<=2%

2.Static parameters are based on package level with recommended wire bonding

■ *TYPICAL CHARACTERISTICS (25℃ Unless Note)*

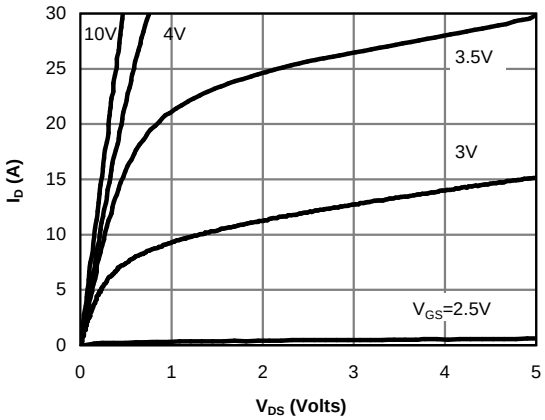


Fig 1: On-Region Characteristics (Note E)

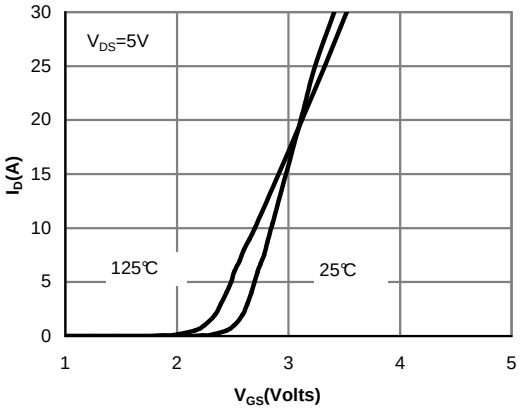


Figure 2: Transfer Characteristics (Note E)

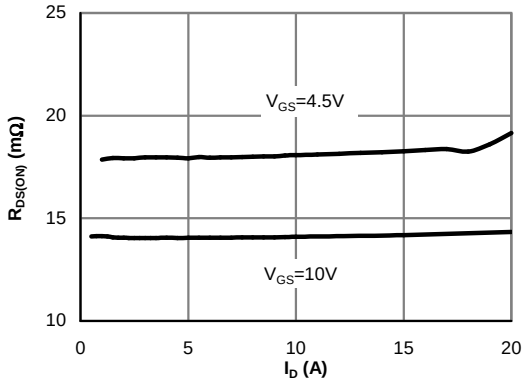


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

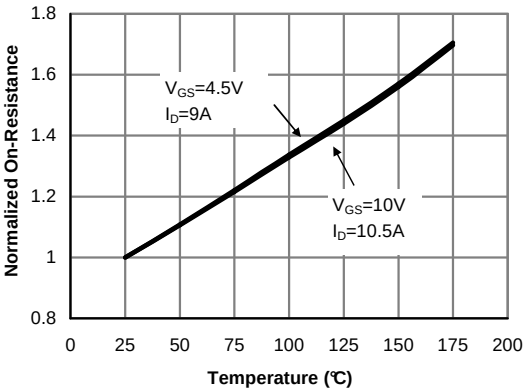


Figure 4: On-Resistance vs. Junction Temperature (Note E)

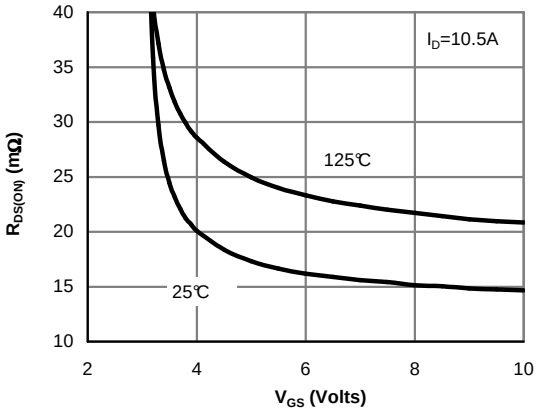


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

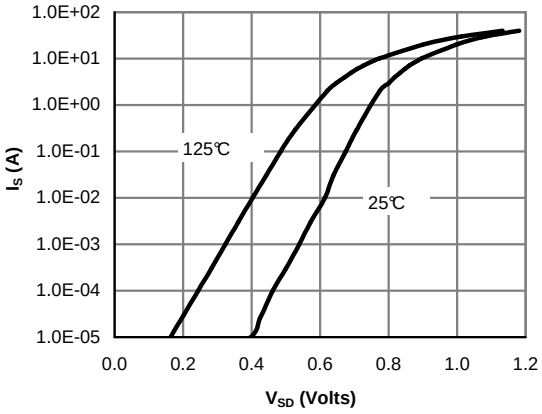


Figure 6: Body-Diode Characteristics (Note E)

■ *TYPICAL CHARACTERISTICS (continuous)*

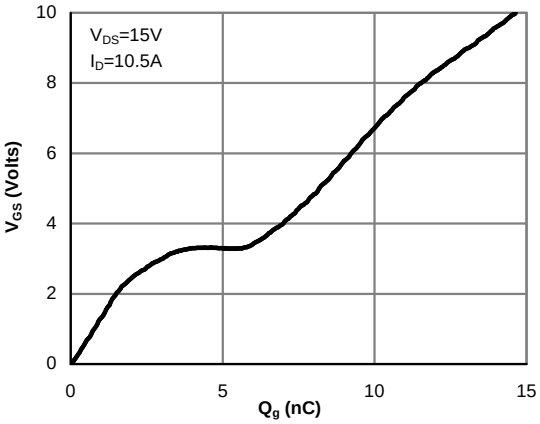


Figure 7: Gate-Charge Characteristics

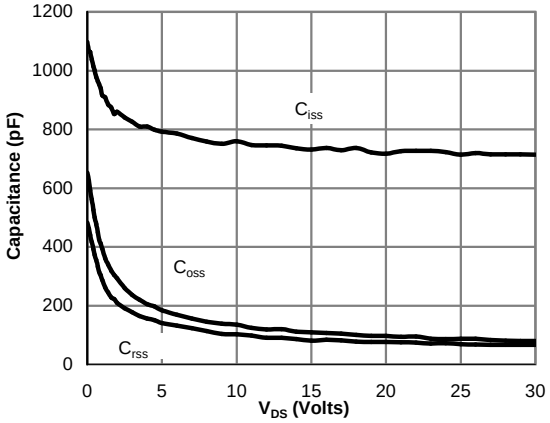


Figure 8: Capacitance Characteristics

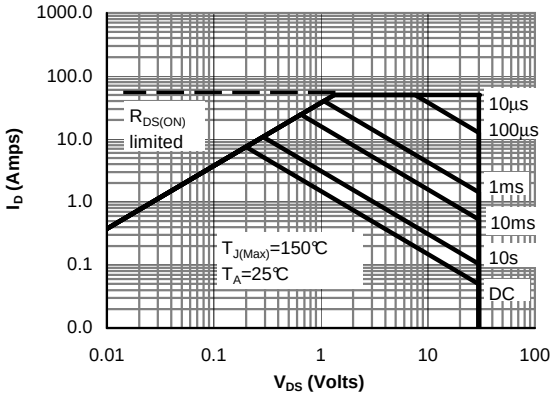


Figure 10: Maximum Forward Biased Safe Operating Area (Note F)

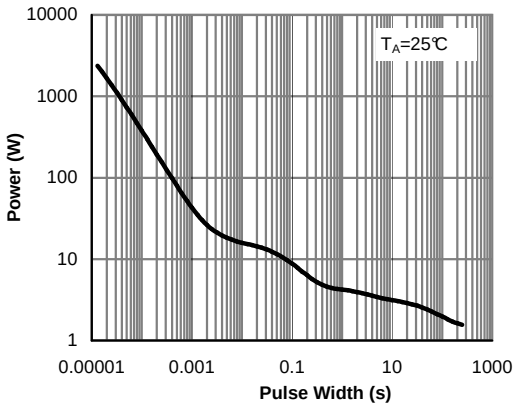


Figure 11: Single Pulse Power Rating Junction-to-Ambient (Note F)

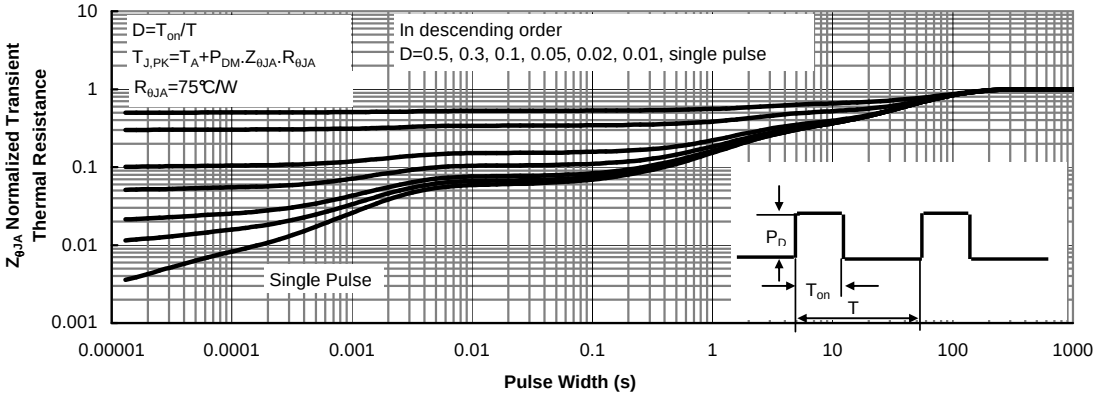
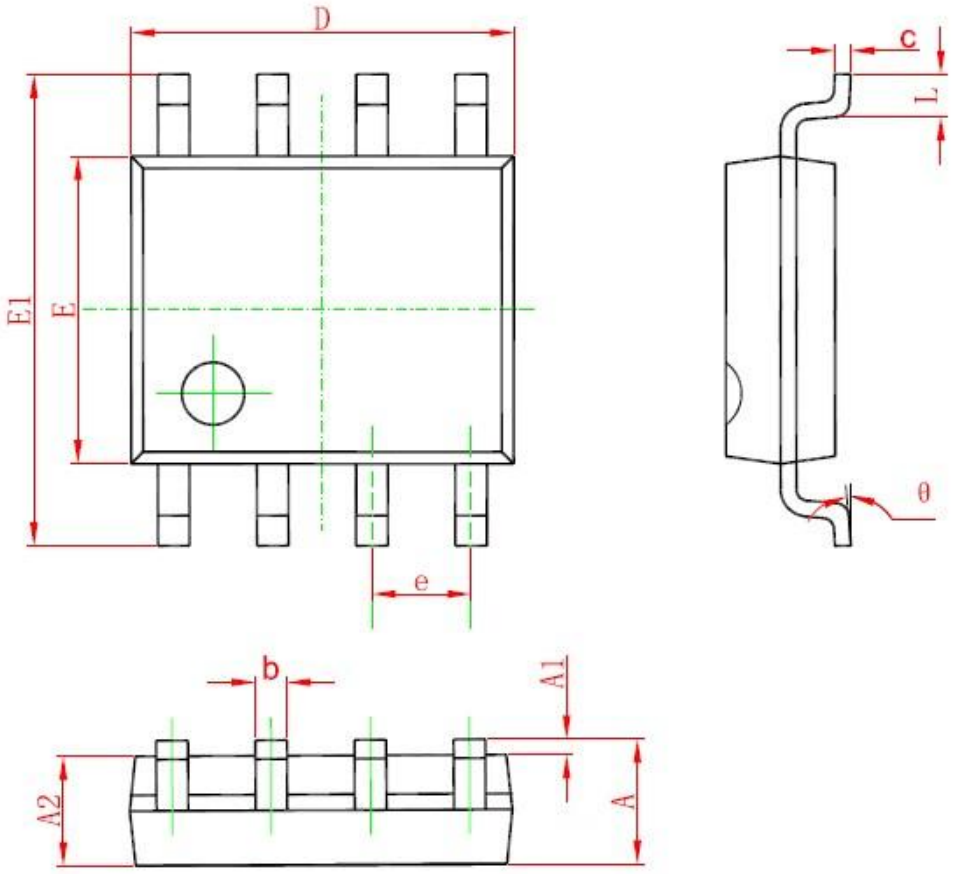


Figure 12: Normalized Maximum Transient Thermal Impedance (Note F)

■ *SOP8 PACKAGE OUTLINE DIMENSIONS*

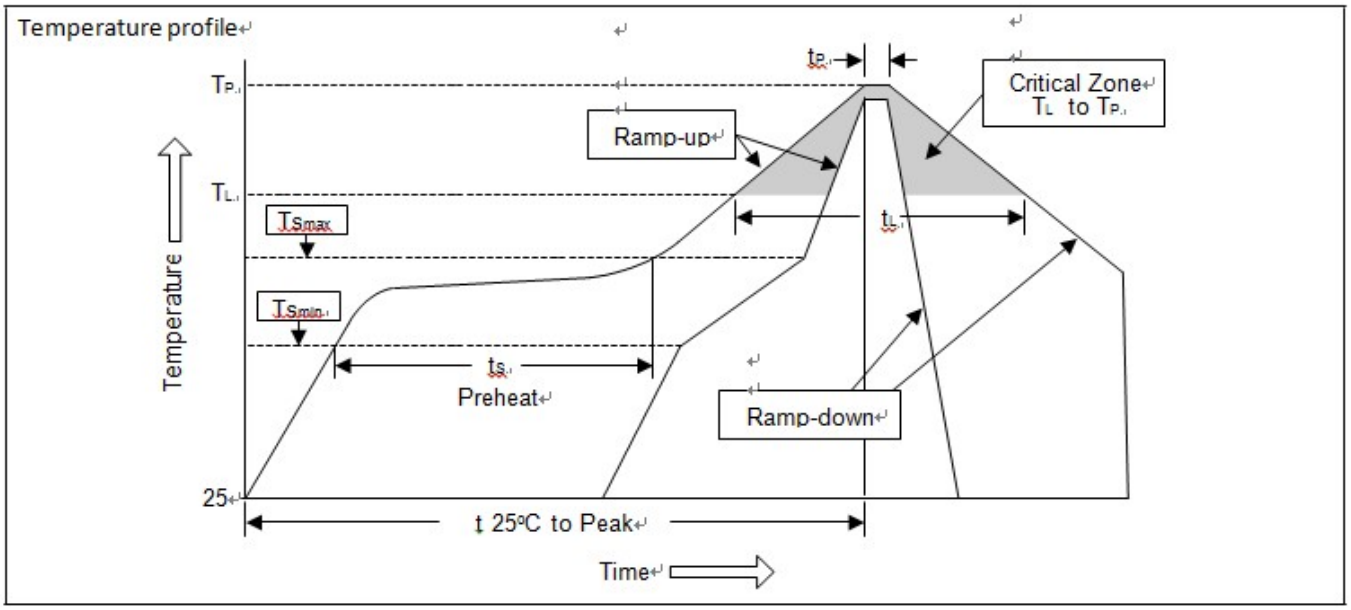


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

■ *SOLDERING METHODS FOR UNIVERCHIP*

Storage environment Temperature=10℃~35℃ Humidity=65%±15%

Reflow soldering of surface mount device



Profile Feature	Sn-Pb Eutectic Assembly	Pb free Assembly
Average ramp-up rate (T_L to T_P)	<3℃/sec	<3℃/sec
Preheat -Temperature Min (Ts_{min}) -Temperature Max (Ts_{max}) -Time (min to max) (ts)	 100℃ 150℃ 60~120 sec	 150℃ 200℃ 60~180 sec
Tsmax to T_L -Ramp-up Rate	<3℃/sec	<3℃/sec
Time maintained above -Temperature (T_L) -Time (t_L)	 183℃ 60~150 sec	 217℃ 60~150 sec
Peak Temperature (T_P)	240℃+0/-5℃	260℃+0/-5℃
Time within 5℃ of actual Peak Temperature (t_P)	10~30 sec	20~40 sec
Ramp-down Rate	<6℃/sec	<6℃/sec
Time 25℃ to Peak Temperature	<6 minutes	<6 minutes