



**P-Channel Enhancement MOSFET**



VDS= -30V, ID= -7.5A

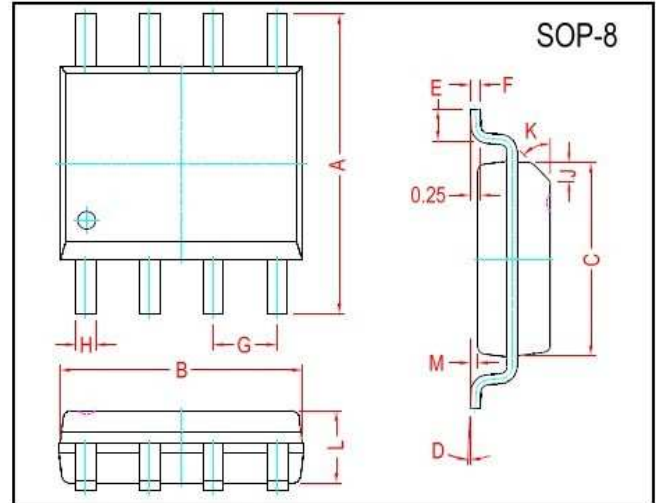
**DESCRIPTION**

The YS4435AM is the highest performance trench P-ch MOSFETs with extreme high cell density, which provide excellent  $R_{DS(ON)}$  and gate charge for most of the synchronous buck converter applications.

The YS4435AM meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

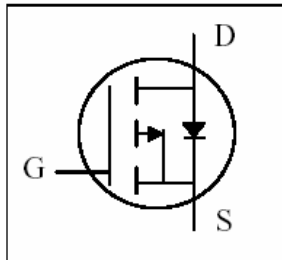
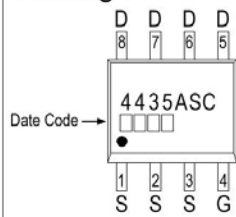
**FEATURES**

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Green Device Available
- 100% EAS Guaranteed



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	5.80	6.20	M	0.10	0.25
B	4.80	5.00	H	0.35	0.51
C	3.80	4.00	L	1.35	1.75
D	0°	8°	J	0.40 REF.	
E	0.40	0.90	K	45° REF.	
F	0.19	0.26	G	1.27 TYP.	

Marking :



**Absolute Maximum Ratings**

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	±20	V
Continuous Drain Current <sup>1</sup> , @ $V_{GS} = -10V$	$I_D @ T_A = 25^\circ C$	-7.5	A
	$I_D @ T_A = 70^\circ C$	-5.8	A
Pulsed Drain Current <sup>2</sup>	$I_{DM}$	-50	A
Total Power Dissipation <sup>4</sup>	$P_D @ T_A = 25^\circ C$	2.5	W
	$P_D @ T_A = 70^\circ C$	1.6	W
Single Pulse Avalanche Energy, $L=0.1mH^3$	$E_{AS}$	72.2	mJ
Single Pulse Avalanche Current, $L=0.1mH^3$	$I_{AS}$	-38	A
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 ~ +150	°C

**Thermal Data**

Parameter	Symbol	Max. Value	Unit
Thermal Resistance Junction-ambient <sup>1</sup>	$R_{\theta JA}$	85	°C/W
Thermal Resistance Junction-ambient <sup>1</sup>	$R_{\theta JC}$	36	°C/W

# DEVICE CHARACTERISTICS

## YS4435AM

### Electrical Characteristics (T<sub>j</sub> = 25°C unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	-30	-	-	V	V <sub>GS</sub> =0, I <sub>D</sub> =-250uA
Gate Threshold Voltage	V <sub>GS(th)</sub>	-1.0	-	-2.5	V	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250uA
Forward Transconductance	g <sub>fs</sub>	-	17	-	S	V <sub>DS</sub> =-5V, I <sub>D</sub> =-6A
Gate-Source Leakage Current	I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> = ±20V
Drain-Source Leakage Current(T <sub>j</sub> =25°C)	I <sub>DSS</sub>	-	-	-1	uA	V <sub>DS</sub> =-24V, V <sub>GS</sub> =0
Drain-Source Leakage Current(T <sub>j</sub> =55°C)		-	-	-5	uA	V <sub>DS</sub> =-24V, V <sub>GS</sub> =0
Static Drain-Source On-Resistance <sup>2</sup>	R <sub>DS(ON)</sub>	-	-	20	mΩ	V <sub>GS</sub> =-10V, I <sub>D</sub> =-6A
		-	-	32		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4A
Total Gate Charge <sup>2</sup>	Q <sub>g</sub>	-	12.6	-	nC	I <sub>D</sub> =-6A V <sub>DS</sub> =-15V V <sub>GS</sub> =-4.5V
Gate-Source Charge	Q <sub>gs</sub>	-	4.8	-		
Gate-Drain ("Miller") Change	Q <sub>gd</sub>	-	4.8	-		
Turn-on Delay Time <sup>2</sup>	T <sub>d(on)</sub>	-	4.6	-	ns	V <sub>DS</sub> =-15V I <sub>D</sub> =-6A V <sub>GS</sub> =-10V R <sub>G</sub> =3.3Ω
Rise Time	T <sub>r</sub>	-	14.8	-		
Turn-off Delay Time	T <sub>d(off)</sub>	-	41	-		
Fall Time	T <sub>f</sub>	-	19.6	-		
Input Capacitance	C <sub>iss</sub>	-	1345	-	pF	V <sub>GS</sub> =0V V <sub>DS</sub> =-15V f=1.0MHz
Output Capacitance	C <sub>oss</sub>	-	194	-		
Reverse Transfer Capacitance	C <sub>rss</sub>	-	158	-		
Gate Resistance	R <sub>g</sub>	-	13	-		

### Guaranteed Avalanche Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Single Pulse Avalanche Energy <sup>5</sup>	EAS	36.45	-	-	mJ	V <sub>DD</sub> =-25V, L=0.1mH, I <sub>AS</sub> =-27A

### Source-Drain Diode

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Diode Forward Voltage <sup>2</sup>	V <sub>SD</sub>	-	-	-1.2	V	I <sub>S</sub> =-1A, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C
Continuous Source Current <sup>1,6</sup>	I <sub>S</sub>	-	-	-7.5	A	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current
Pulsed Source Current <sup>2,6</sup>	I <sub>SM</sub>	-	-	-50	A	
Reverse Recovery Time	t <sub>rr</sub>	-	16.3	-	ns	I <sub>F</sub> =-6A, dI/dt=100A/μs, T <sub>J</sub> =25°C
Reverse Recovery Charge	Q <sub>rr</sub>	-	5.9	-	nC	

Notes: 1. Surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper.

2. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.

3. The EAS data shows Max. rating. The test condition is V<sub>DD</sub>= -25V, V<sub>GS</sub>= -10V, L=0.1mH, I<sub>AS</sub>= -38A.

4. The power dissipation is limited by 150°C junction temperature.

5. The Min. value is 100% EAS tested guarantee.

6. The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.

# DEVICE CHARACTERISTICS

## YS4435AM

### Typical Characteristics

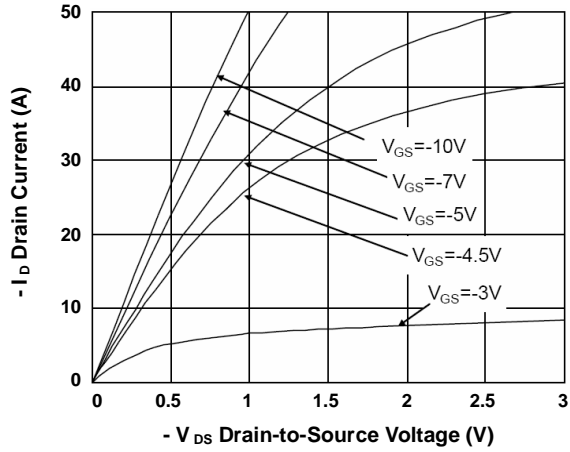


Fig.1 Typical Output Characteristics

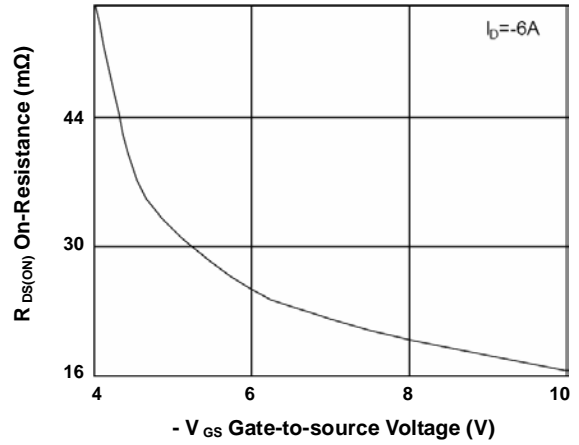


Fig.2 On-Resistance vs. G-S Voltage

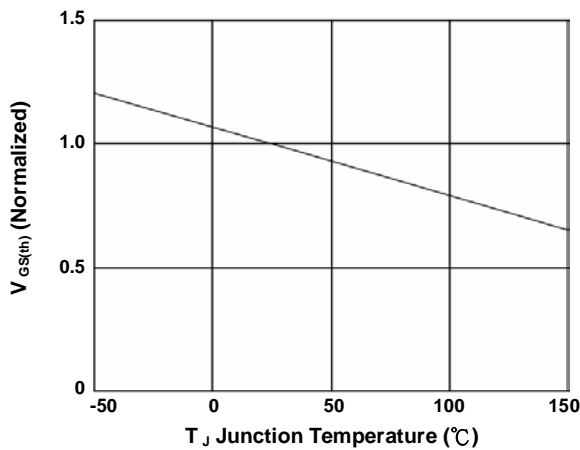


Fig.3 Normalized  $V_{GS(th)}$  vs.  $T_J$

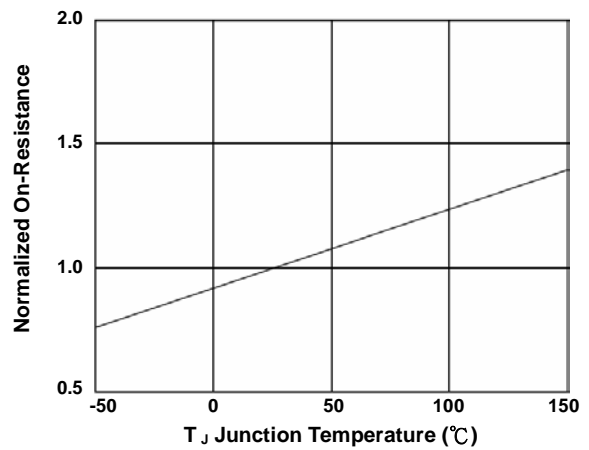


Fig.4 Normalized  $R_{DS(ON)}$  vs.  $T_J$

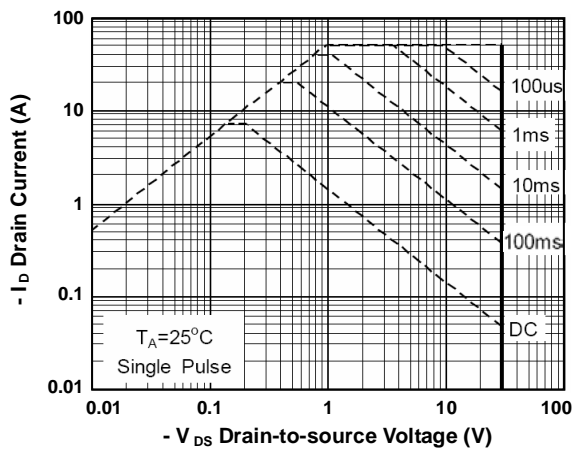


Fig.5 Safe Operating Area

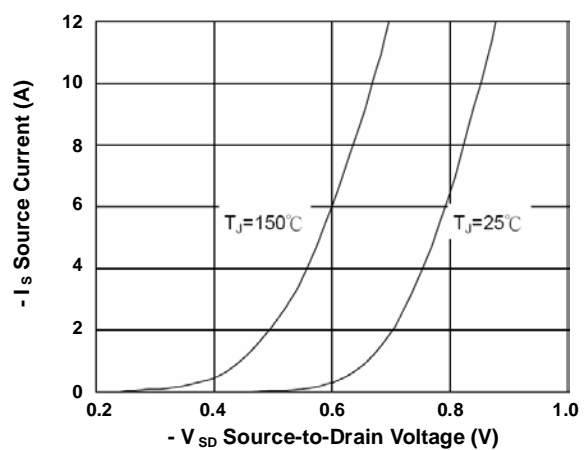


Fig.6 Forward Characteristics of Reverse

# DEVICE CHARACTERISTICS

## YS4435AM

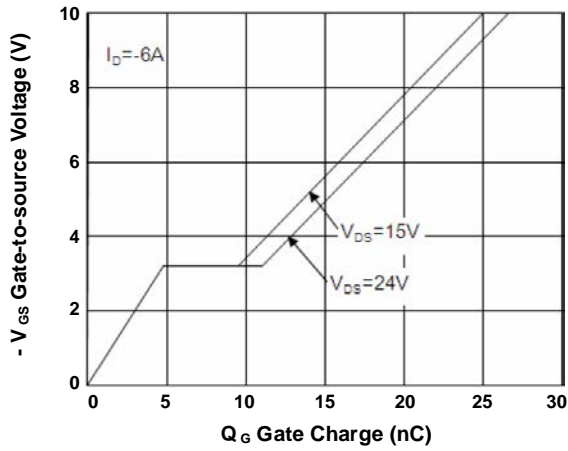


Fig.7 Gate Charge Characteristics

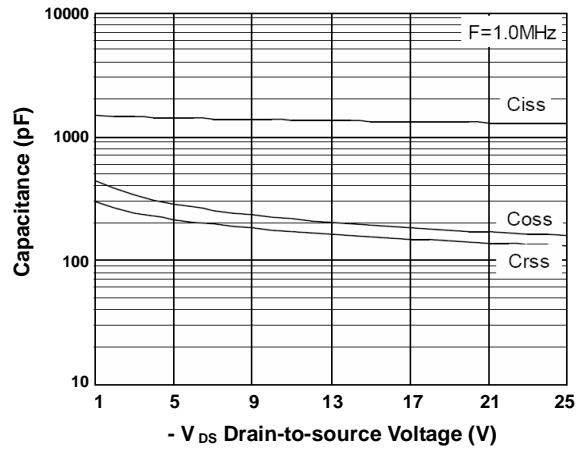


Fig.8 Capacitance Characteristics

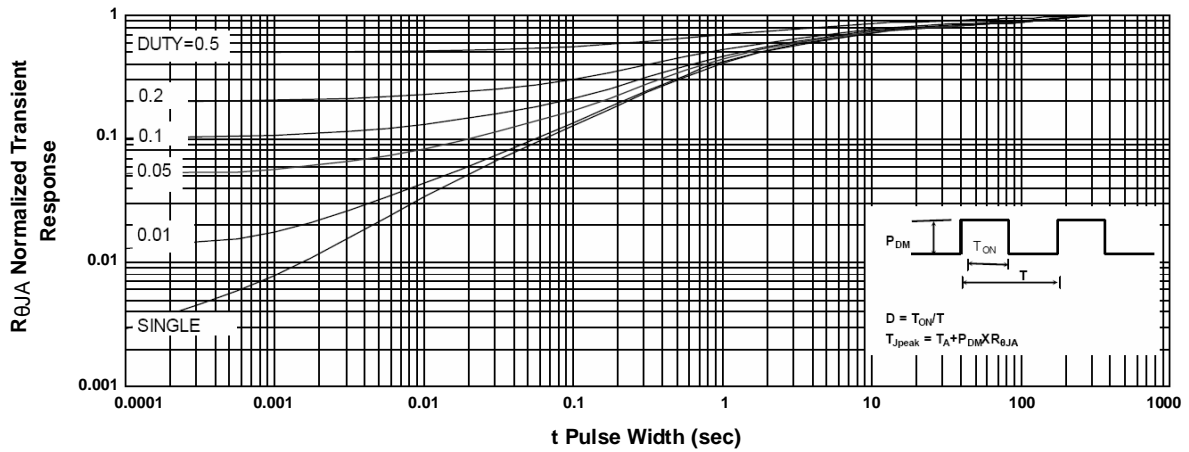


Fig.9 Normalized Maximum Transient Thermal Impedance

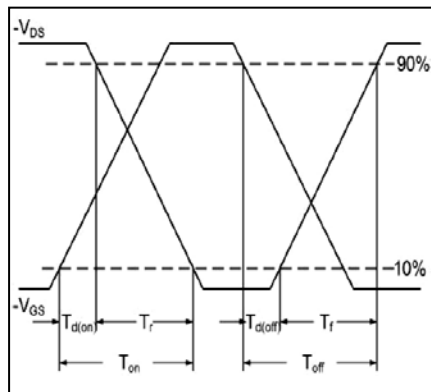


Fig.10 Switching Time Waveform

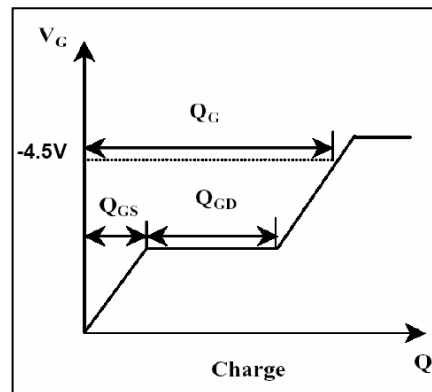


Fig.11 Gate Charge Waveform