



YEA SHIN TECHNOLOGY CO., LTD

YS60N04BA

## N-Channel Enhancement MOSFET

VDS = 40V, ID = 60A



### DESCRIPTION

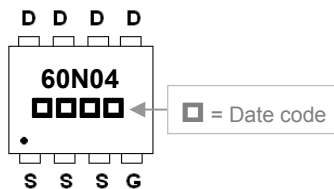
The YS60N04BA is the highest performance trench N-Ch MOSFETs with extreme high cell density, which provide excellent  $R_{DS(ON)}$  and gate charge for most of the synchronous buck converter applications.

The YS60N04BA meet the RoHS and Green Product requirement with full function reliability approved.

### FEATURES

- Advanced High Cell Density Technology
- Super Low Gate Charge

### MARKING



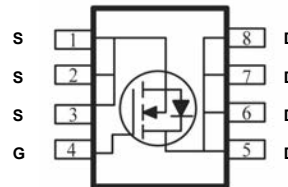
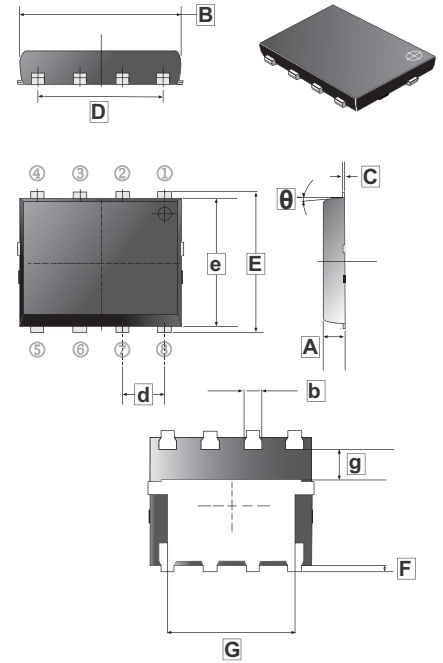
### PACKAGE INFORMATION

Package	MPQ	Leader Size
PPAK5x6	3K	13 inch

### ORDER INFORMATION

Part Number	Type
YS60N04BA	Lead (Pb)-free and Halogen-free

PPAK5x6



REF.	Millimeter	REF.	Millimeter
	Min. Max.		Min. Max.
A	0.9 1.1	$\theta$	0° 12°
B	4.9 5.1	b	0.33 0.51
C	0.2 0.3	d	1.27 BSC
D	3.81 4	e	5.7 5.9
E	5.95 6.2	q	1.1 1.4
F	0.1 0.2		
G	3.81 4		

### ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	$V_{DS}$	40	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>1</sup> , @ $V_{GS}=10V$	$T_C=25^\circ C$	60	A
	$T_C=100^\circ C$	45	
	$T_A=25^\circ C$	12	
	$T_A=70^\circ C$	9.6	
Pulsed Drain Current <sup>3</sup>	$I_{DM}$	120	A
Total Power Dissipation	$T_C=25^\circ C$	52	W
	$T_A=25^\circ C$	2	
Operating Junction & Storage Temperature	$T_J, T_{STG}$	-55~150	$^\circ C$
Thermal Resistance Ratings			
Thermal Resistance Junction-Ambient <sup>1</sup>	$R_{\theta JA}$	62.5	$^\circ C/W$
Thermal Resistance Junction-Ambient <sup>2</sup>		110	
Thermal Resistance Junction-Case <sup>1</sup>	$R_{\theta JC}$	2.4	

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## ELECTRICAL CHARACTERISTICS (T<sub>J</sub>=25°C unless otherwise specified)

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>	40	-	-	V      V <sub>GS</sub> =0, I <sub>D</sub> =250μA
Gate Threshold Voltage		V <sub>GS(th)</sub>	1	-	2.5	V      V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA
Forward Transconductance		g <sub>fs</sub>	-	39	-	S      V <sub>DS</sub> =5V, I <sub>D</sub> =12A
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	μA      V <sub>DS</sub> =32V, V <sub>GS</sub> =0
	T <sub>J</sub> =55°C		-	-	5	
Static Drain-Source On-Resistance <sup>4</sup>		R <sub>DS(ON)</sub>	-	-	8.5	mΩ      V <sub>GS</sub> =10V, I <sub>D</sub> =12A
			-	-	10	
Total Gate Charge		Q <sub>g</sub>	-	18.8	-	nC      I <sub>D</sub> =12A V <sub>DS</sub> =20V V <sub>GS</sub> =4.5V
Gate-Source Charge		Q <sub>gs</sub>	-	4.7	-	
Gate-Drain ("Miller") Charge		Q <sub>gd</sub>	-	8.2	-	
Turn-on Delay Time		T <sub>d(on)</sub>	-	14.3	-	nS      V <sub>DD</sub> =15V I <sub>D</sub> =1A V <sub>GS</sub> =10V R <sub>G</sub> =3.3Ω
Rise Time		T <sub>r</sub>	-	2.6	-	
Turn-off Delay Time		T <sub>d(off)</sub>	-	77	-	
Fall Time		T <sub>f</sub>	-	4.8	-	
Input Capacitance		C <sub>iss</sub>	-	2332	-	pF      V <sub>GS</sub> =0 V <sub>DS</sub> =15V f=1MHz
Output Capacitance		C <sub>oss</sub>	-	193	-	
Reverse Transfer Capacitance		C <sub>rss</sub>	-	138	-	
Source-Drain Diode						
Diode Forward Voltage <sup>4</sup>		V <sub>SD</sub>	-	-	1.2	V      I <sub>S</sub> =1A, V <sub>GS</sub> =0
Continuous Source Current <sup>1</sup>		I <sub>S</sub>	-	-	60	A
Pulsed Source Current <sup>3</sup>		I <sub>SM</sub>	-	-	120	A

Notes:

1. Surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper.
2. When Mounted On Min. Copper Pad.
3. Pulse width limited by maximum junction temperature, pulse width ≤ 300μs, duty cycle ≤ 2%.
4. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%.

# YS60N04BA

## CHARACTERISTIC CURVES

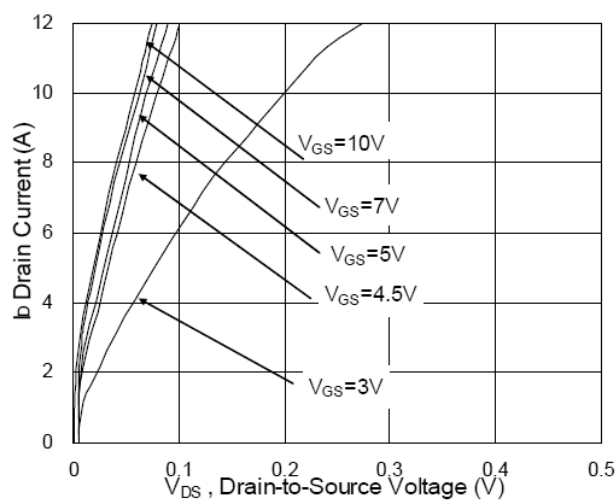


Fig.1 Typical Output Characteristics

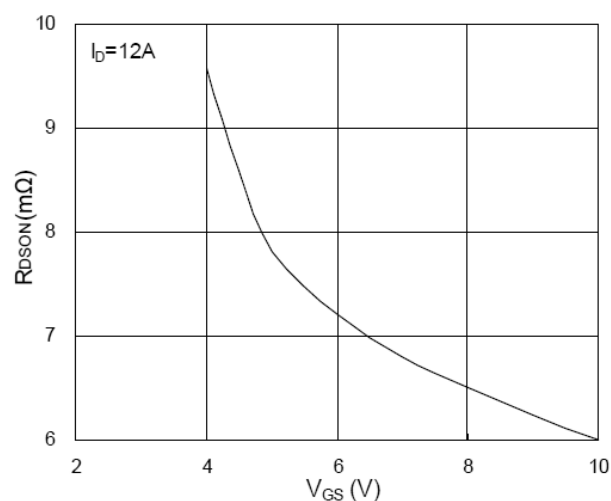


Fig.2 On-Resistance vs. G-S Voltage

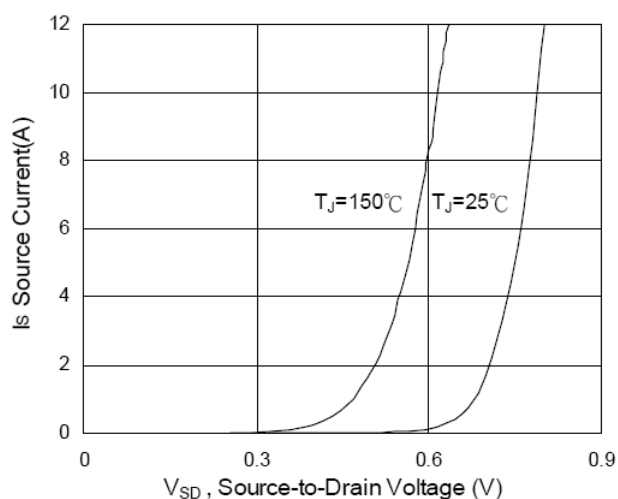


Fig.3 Forward Characteristics of Reverse

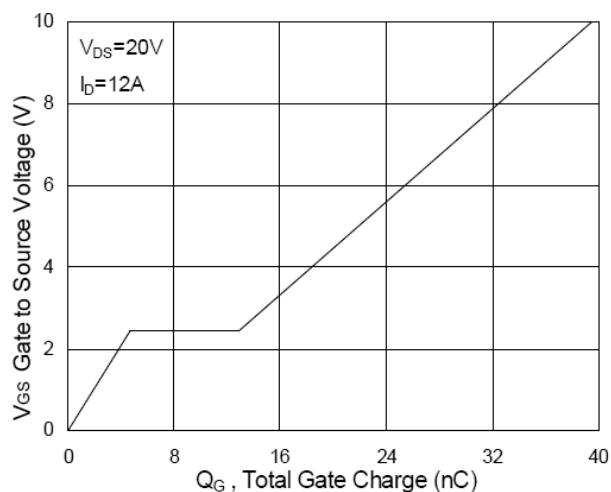


Fig.4 Gate-Charge Characteristics

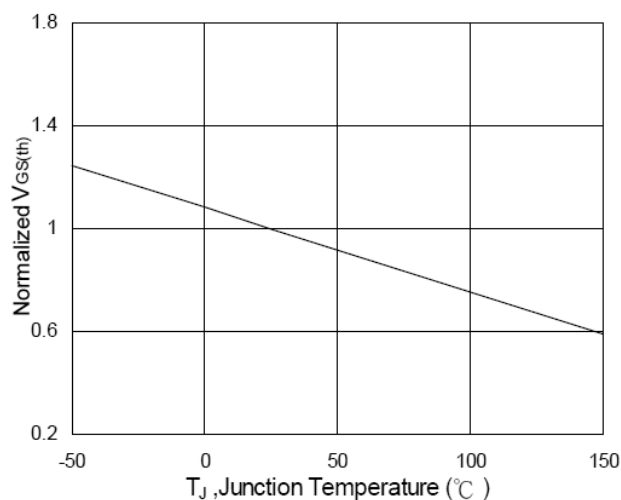


Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$

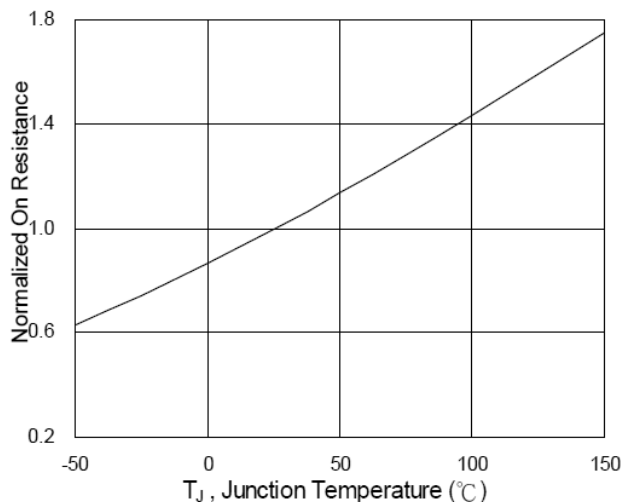


Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$

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## CHARACTERISTIC CURVES

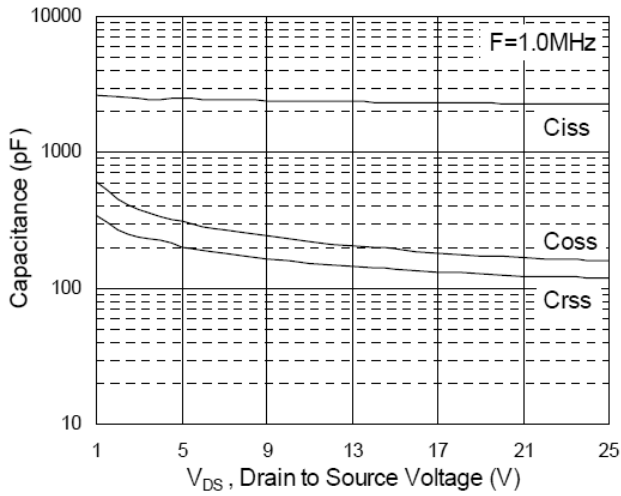


Fig.7 Capacitance

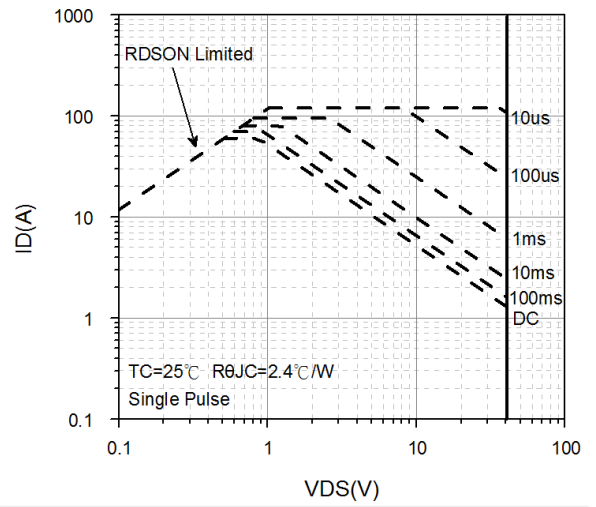


Fig.8 Safe Operating Area

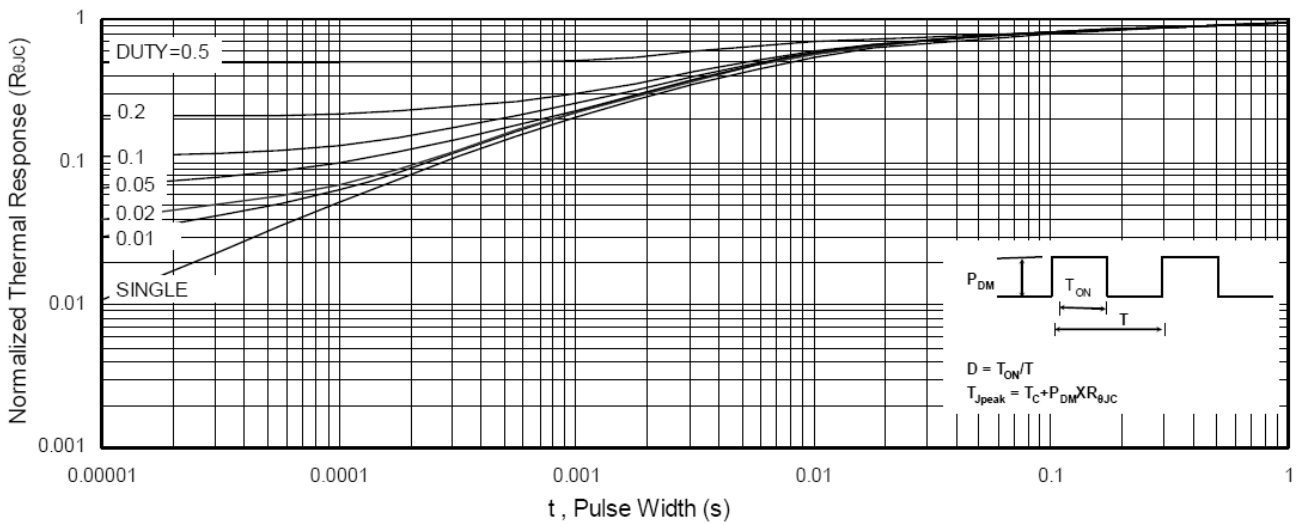


Fig.9 Normalized Maximum Transient Thermal Impedance

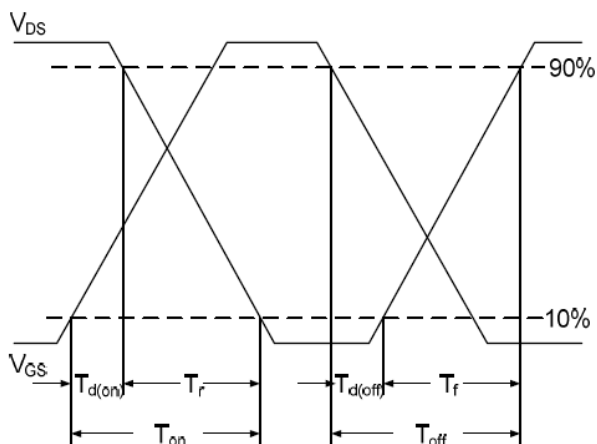


Fig.10 Switching Time Waveform

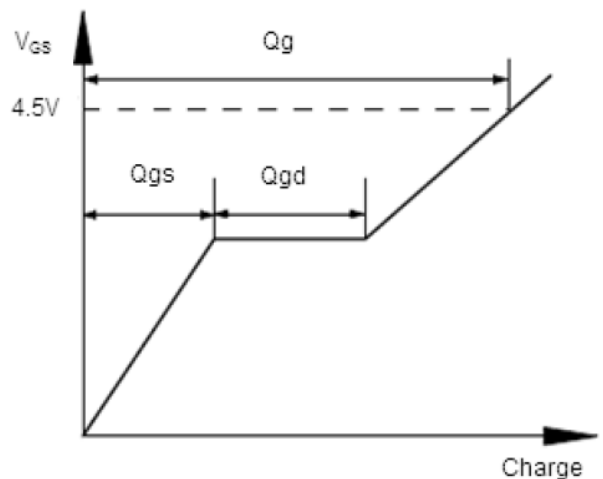


Fig.11 Gate Charge Waveform