1. Description

The 40N06 is the highest performance trench N-ch MOSFETs with extreme high cell density,which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.The 40N06 meet the RoHS and Green Product requirenment,100%EAS guaranteed with full function reliability approved.

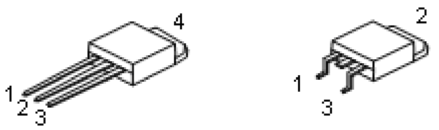
2. Features

- $R_{DS(on)}$=14mΩ @ V_{DS}=60V
- Avanced high cell density Trench technology
- Super Low Gate Charge
- Excellent Cdv/dt effect decline
- 100%EAS Guaranteed
- Green Device Available

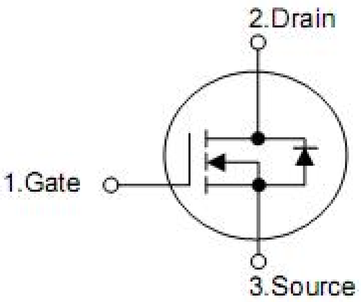
3. Applications

- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- LCD/LED back light

4.Symbol



TO-251 TO-252



Pin	Function
1	Gate
2	Drain
3	Source

5. Absolute maximum ratings

Parameter		Symbol	Rating	Units
Drain-source voltage		V_{DS}	60	V
Gate-source voltage		V_{GS}	$\pm$20	V
Continuous drain current, V_{GS} @10V[1]	T_C=25ºC	I_D	38	A
	T_C=100ºC		30	A
Pulsed drain current [2]		I_{DM}	80	A
Single pulse avalanche energy[3]		E_{AS}	67	mJ
Avalanche current		I_{AS}	28	A
Total power dissipation[4]	T_C=25 ºC	P_D	45	W
Operation junction temperature range		T_J	-55 to150	ºC
Storage temperature range		T_{STG}	-55 to150	ºC

6. Thermal characteristics

Parameter	Symbol	Typ	Max	Unit
Thermal resistance,Junction-ambient[1]	$R_{\theta JA}$	--	62	ºC/W
Thermal resistance,Junction-case[1]	$R_{\theta JC}$	--	2.8	

7. Electrical characteristics

(T_J=25°C,unless otherwise noted

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0V,I_D=250μA	60	-	-	V
BV_{DSS} temperature coefficient	$\triangle BV_{DSS}/\triangle T_J$	Reference to 25 ºC, I_D=1mA		0.057		V/°C
Static drain-source on-resistance[2]	$R_{DS(on)}$	V_{GS}=10V,I_D=15A		14	18	mΩ
		V_{GS}=4.5V,I_D=10A		16	20	
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1.2		2.5	V
$V_{GS(th)}$ temperature coefficient	$\triangle V_{GS(th)}$			-5.68		mV/°C
Drain-source leakage current	I_{DSS}	V_{DS}=48V, V_{GS}=0V T_J=25°C			1	μA
		V_{DS}=48V, V_{GS}=0V T_J=55°C			5	μA
Gate- source leakage current	I_{GSS}	V_{GS}=$\pm$20V, V_{DS}=0V			$\pm$100	nA
Forward transconductance	gfs	V_{DS}=5V, I_D=15A		45		S
Gate resistance	R_g	V_{DS}=0V, V_{GS}=0V,f=1MHz		1.7	3.4	Ω
Total gate charge(4.5V)	Q_g	V_{DS}=48V, V_{GS}=4.5V I_D =12A	-	17.6		nC
Gate-source charge	Q_{gs}			5.35		
Gate-drain charge	Q_{gd}			6.81		
Turn-on delay time	$t_{d(on)}$	V_{DD}=15V,I_D=1A, R_G=3.3Ω, V_{GS}=10V		15.5		ns
Rise time	t_r			2.2		
Turn-off delay time	$t_{d(off)}$			72.8		
Fall time	t_f			3.8		
Input capacitance	C_{iss}	V_{DS}=15V,V_{GS}=0V, f=1MHz		2423		pF
Output capacitance	C_{oss}			145		
Reverse transfer capacitance	C_{rss}			97		
Single pulse avalanche energy[5]	EAS	V_{DD}=25V,L=0.1mH, I_{AS}=15A	19			mJ
Continuous source current[1,6]	I_S	V_G= V_D=0V, Force current			38	A
Pulsed source current[2,6]	I_{SM}				80	A
Diode forward voltage[2]	V_{SD}	V_{GS}=0V,I_S=1A, T_J=25ºC			1	V

Note:1.The data tested by surface mounted on a 1 inch^2 FR-4 board with 20Z copper.

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

3.The EAS data shows Max.rating.The test condition is V_{DD}=25V, V_{GS}=10V,L=0.1mH,I_{AS}=28A

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_D and I_{DM},in real applications, should be limited by total power dissipation.

8. Test circuits and waveforms

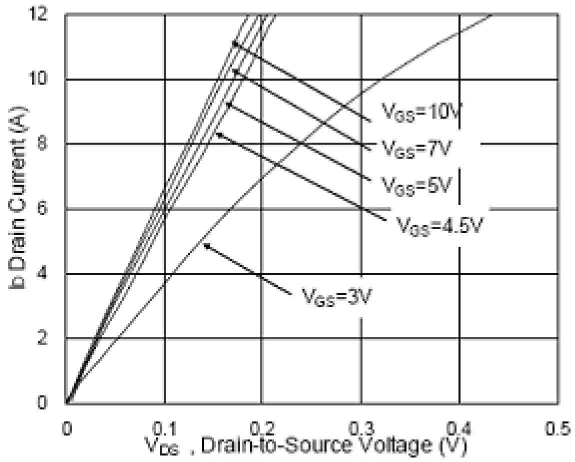


Fig.1 Typical Output Characteristics

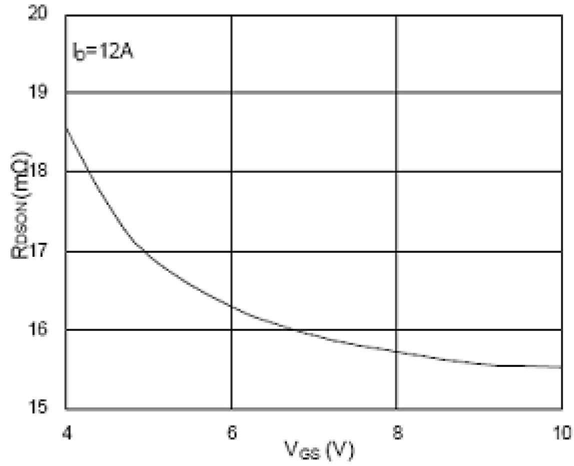


Fig.2 On-Resistance v.s Gate-Source

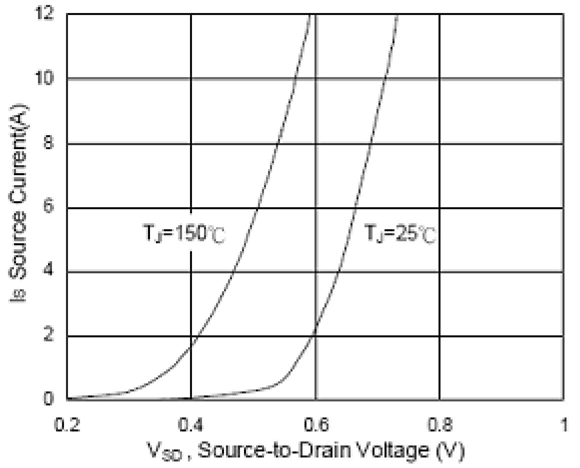


Fig.3 Forward Characteristics of Reverse

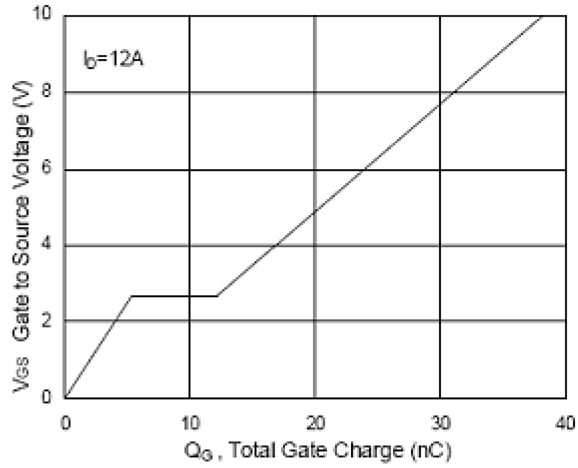


Fig.4 Gate-Charge characteristics

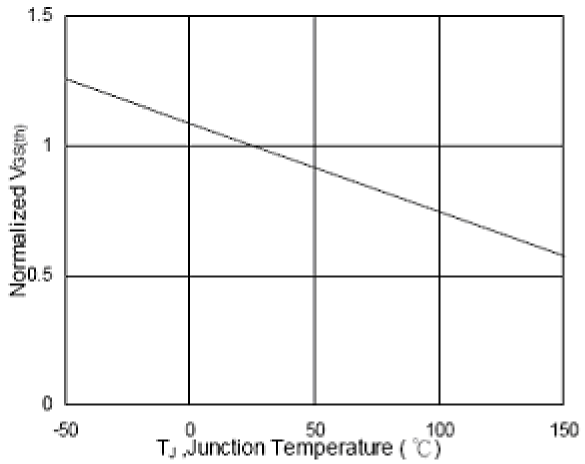


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

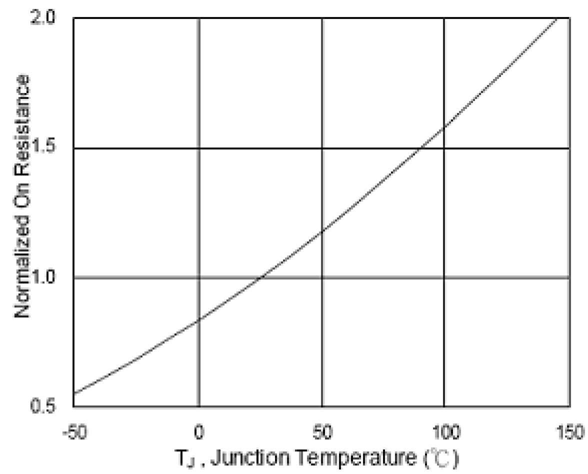


Fig.6 Normalized R_{DSON} v.s T_J

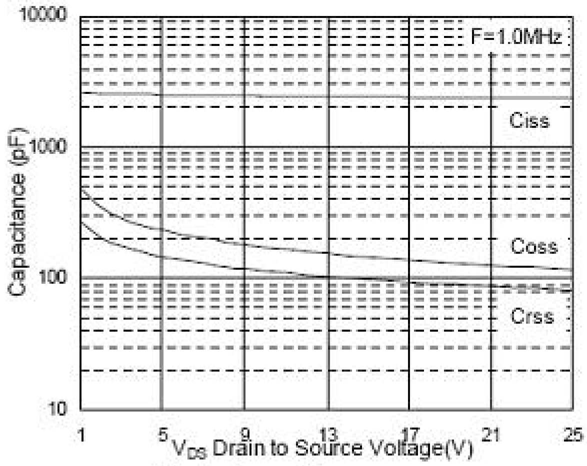


Fig.7 Capacitance

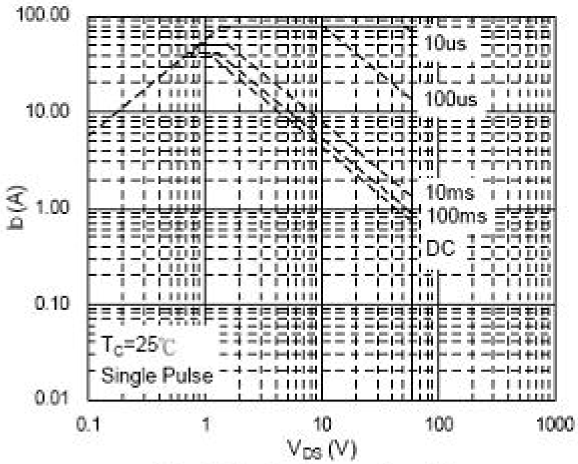


Fig.8 Safe Operating Area

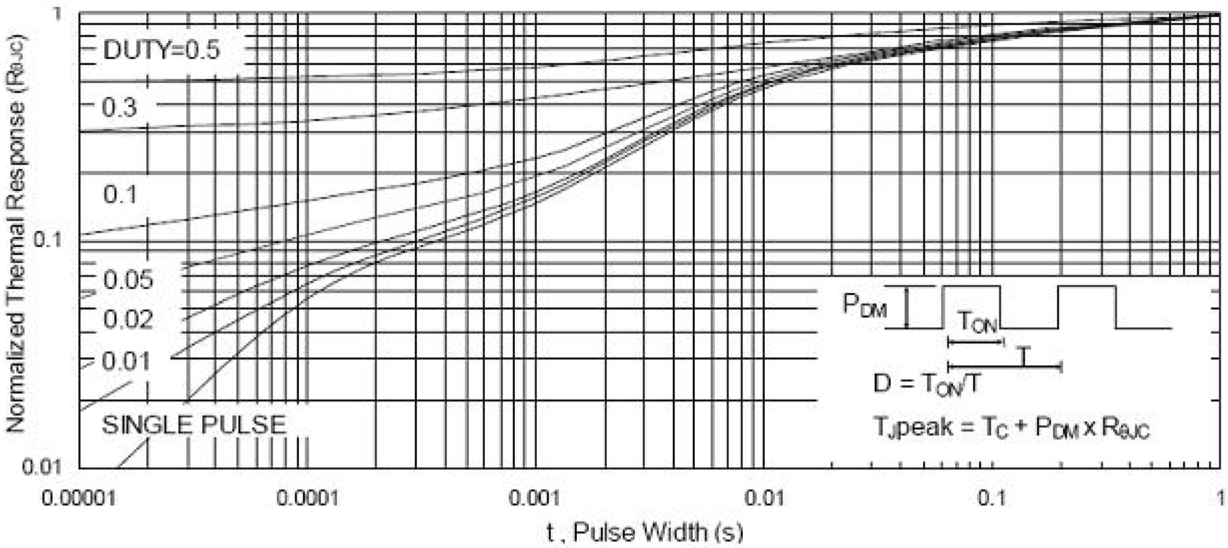


Fig.9 Normalized Maximum Transient Thermal Impedance

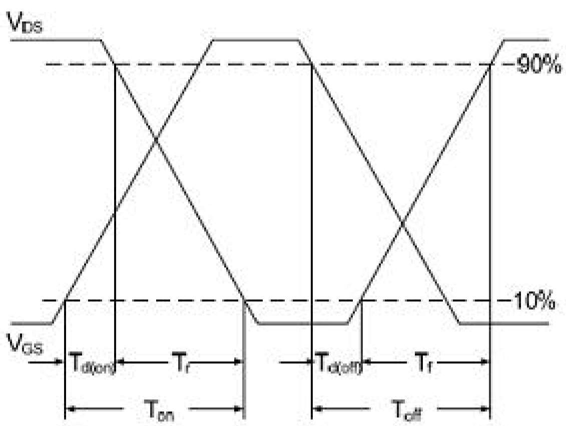


Fig.10 Switching Time Waveform

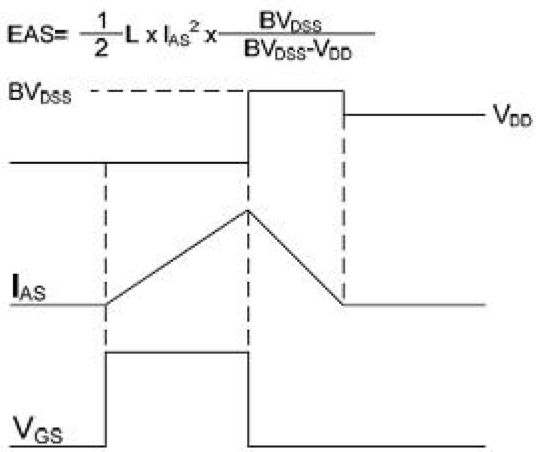


Fig.11 Unclamped Inductive Waveform