QM3004U1

N-Ch 30V Fast Switching MOSFETs

General Description

The QM3004U1 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 QM3004U1 meet the RoHS and Halogen-free Product requirement , 100% EAS guaranteed with full function reliability approved.

Product Summery

Halogen-Free

BVDSS	RDSON	ID
30V	8.5mΩ	55A

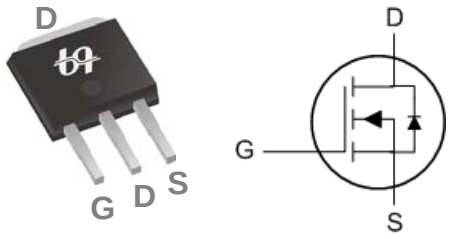
Features

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

Applications

- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- Load Switch

TO251S Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	±20	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ 10V	55	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ 10V	40	A
I_D@T_A=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	13.6	A
I_D@T_A=70℃	Continuous Drain Current, V_{GS} @ 10V[1]	11.4	A
I_{DM}	Pulsed Drain Current[2]	110	A
EAS	Single Pulse Avalanche Energy[3]	130	mJ
I_{AS}	Avalanche Current	34	A
P_D@T_C=25℃	Total Power Dissipation[4]	41	W
P_D@T_A=25℃	Total Power Dissipation[4]	2.42	W
T_{STG}	Storage Temperature Range	-55 to 175	℃
T_J	Operating Junction Temperature Range	-55 to 175	℃

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient (Steady State)[1]	---	62	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	3.6	℃/W

Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	30	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BVDSS Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.027	---	V/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V , I_D=30A	---	7.5	8.5	mΩ
		V_{GS}=4.5V , I_D=15A	---	11	14	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.2	1.5	2.5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5.8	---	mV/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=30V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=30V , V_{GS}=0V , T_J=55℃	---	---	5	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=5V , I_D=30A	---	38	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	2.2	3.5	Ω
Q_g	Total Gate Charge (4.5V)	V_{DS}=15V , V_{GS}=4.5V , I_D=15A	---	12.8	16	nC
Q_{gs}	Gate-Source Charge		---	4.6	5.8	
Q_{gd}	Gate-Drain Charge		---	4.96	6.2	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=15V , V_{GS}=10V , R_G=3.3Ω , I_D=15A	---	4.6	5.8	ns
T_r	Rise Time		---	12.2	15.3	
$T_{d(off)}$	Turn-Off Delay Time		---	26.6	33.2	
T_f	Fall Time		---	8	10	
C_{iss}	Input Capacitance	V_{DS}=15V , V_{GS}=0V , f=1MHz	---	1317	1580	pF
C_{oss}	Output Capacitance		---	163	196	
C_{rss}	Reverse Transfer Capacitance		---	131	158	

Guaranteed Avalanche Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy[5]	V_{DD}=25V , L=0.1mH , I_{AS}=20A	45	---	---	mJ

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,6]	V_G=V_D=0V , Force Current	---	---	55	A
I_{SM}	Pulsed Source Current[2,6]		---	---	110	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1.2	V
t_{rr}	Reverse Recovery Time	IF=30A , dI/dt=100A/μs , T_J=25℃	---	9.2	---	nS
Q_{rr}	Reverse Recovery Charge		---	2	---	nC

Note :
1.The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ 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_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=34A
4.The power dissipation is limited by 175℃ 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.

Typical Characteristics

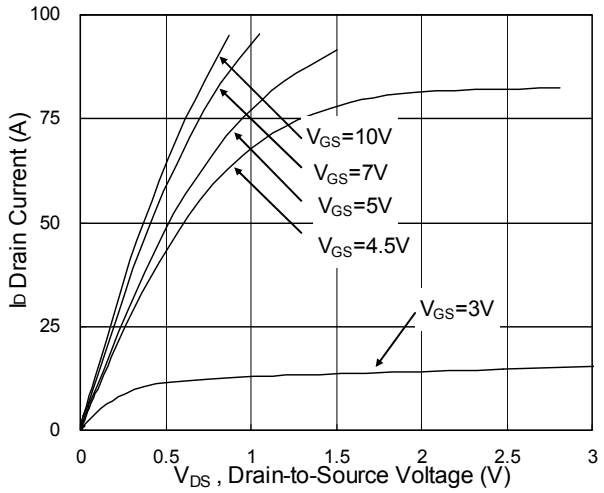


Fig.1 Typical Output Characteristics

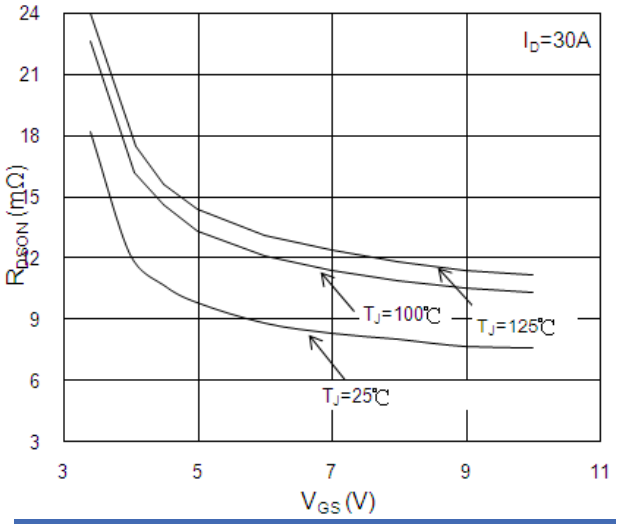


Fig.2 On-Resistance vs. G-S Voltage

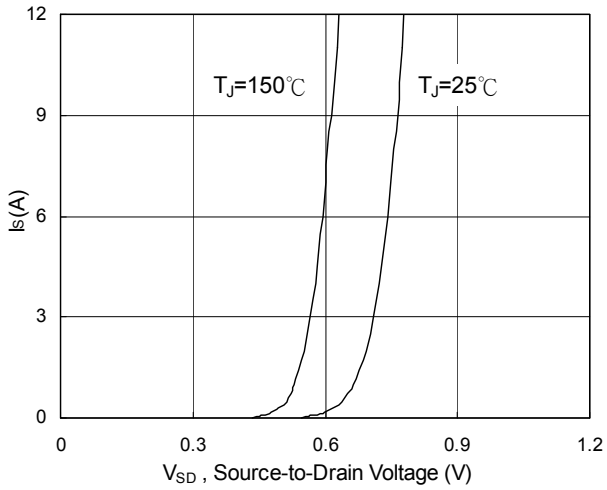


Fig.3 Forward Characteristics of Reverse

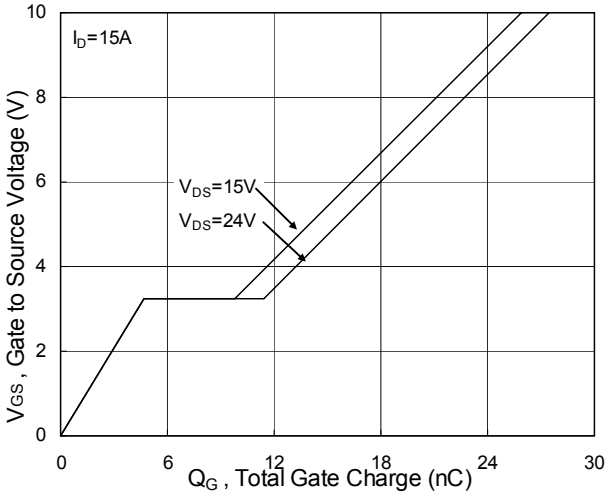


Fig.4 Gate-Charge Characteristics

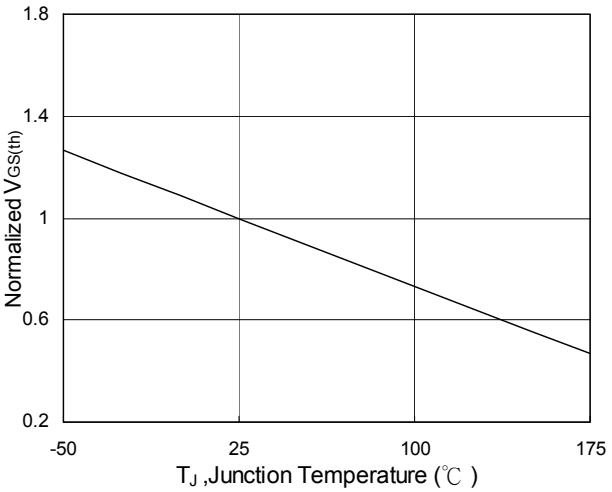


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

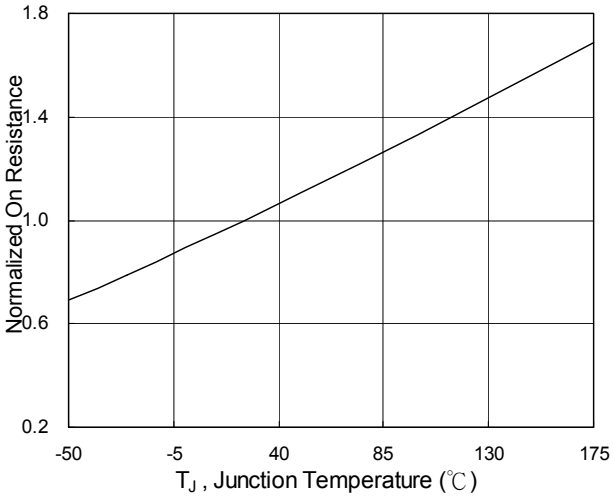


Fig.6 Normalized R_{DSON} vs. T_J

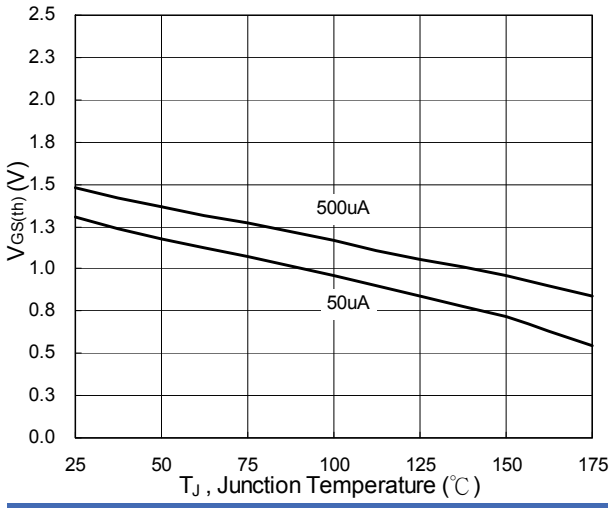


Fig.7 $V_{GS(th)}$ vs. T_J

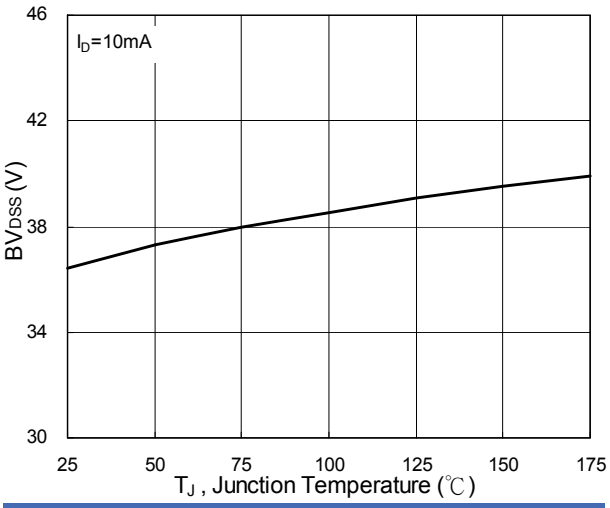


Fig.8 BVDSS vs. T_J

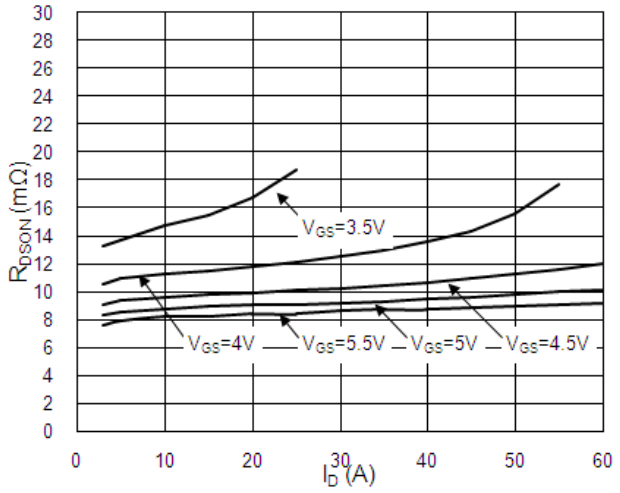


Fig.9 On-Resistance vs. Drain Current

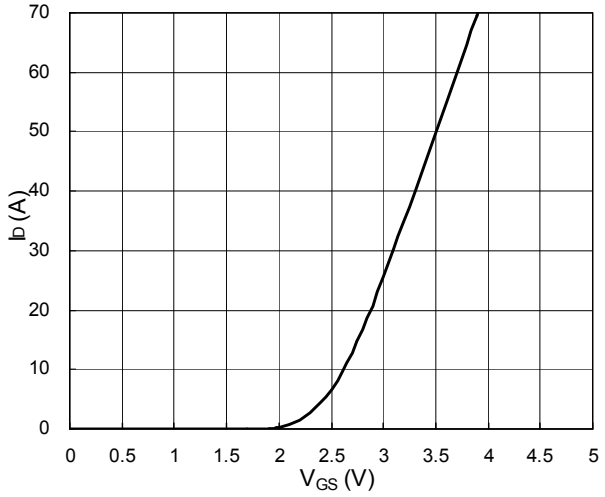


Fig.10 Transfer Characteristics

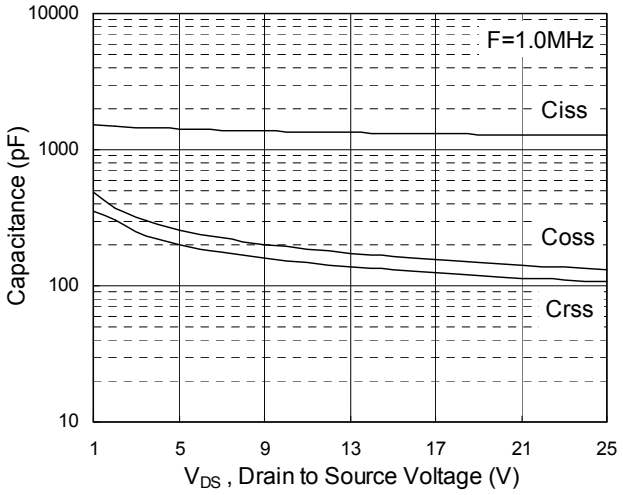


Fig.11 Capacitance

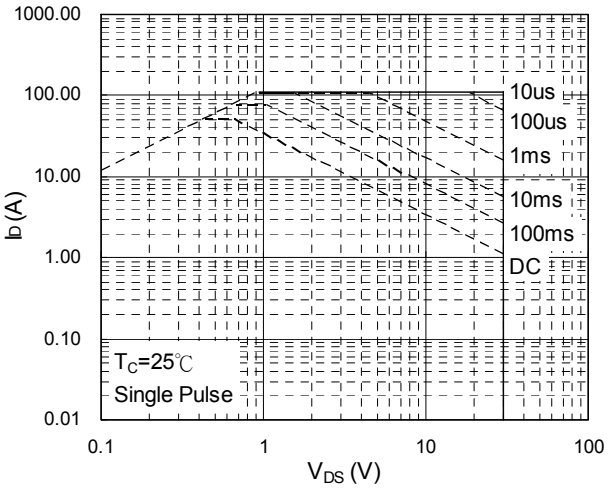


Fig.12 Safe Operating Area

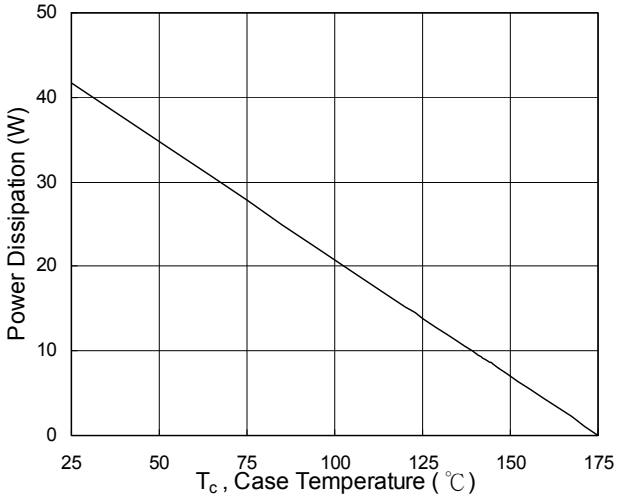


Fig.13 Power Derating

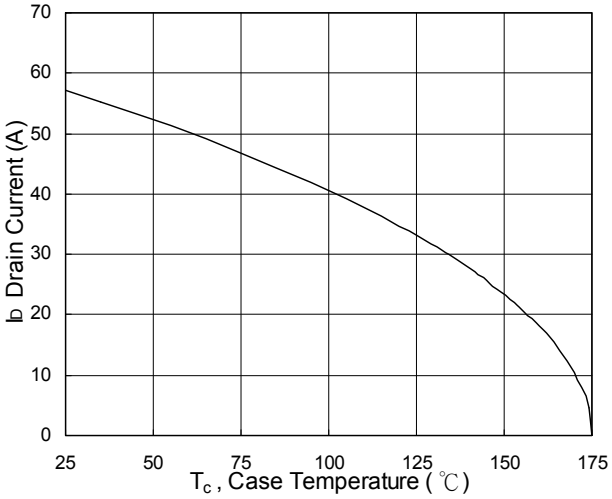


Fig.14 Current Derating

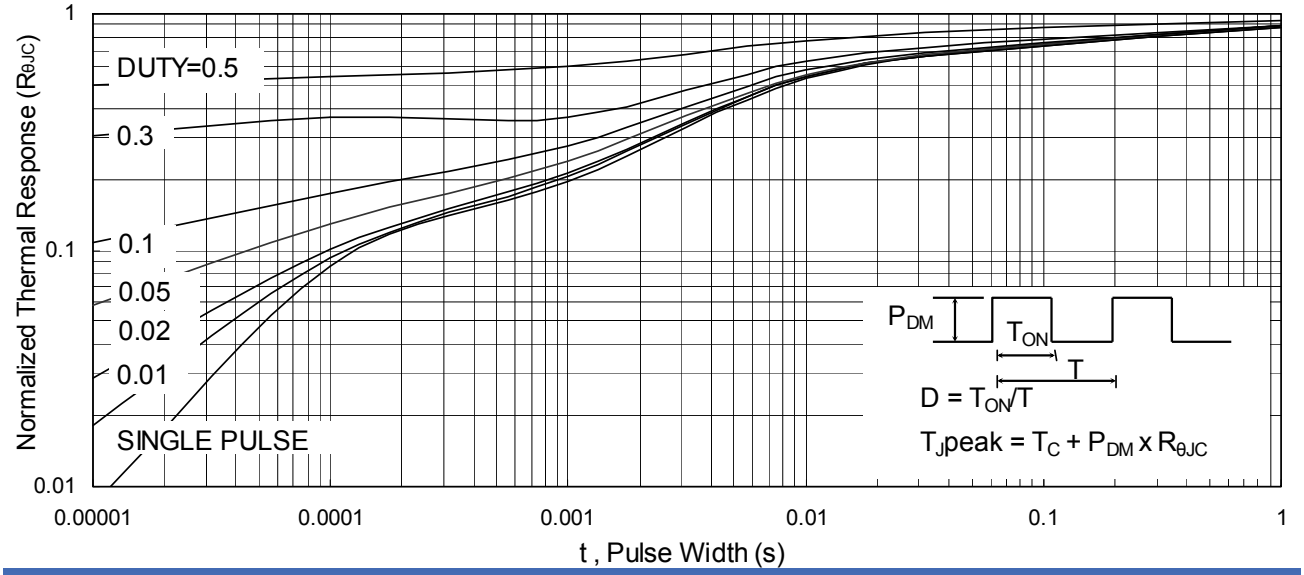


Fig.15 Normalized Maximum Transient Thermal Impedance

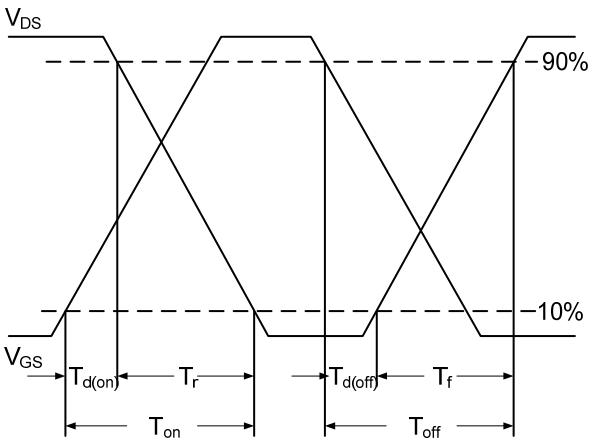


Fig.16 Switching Time Waveform

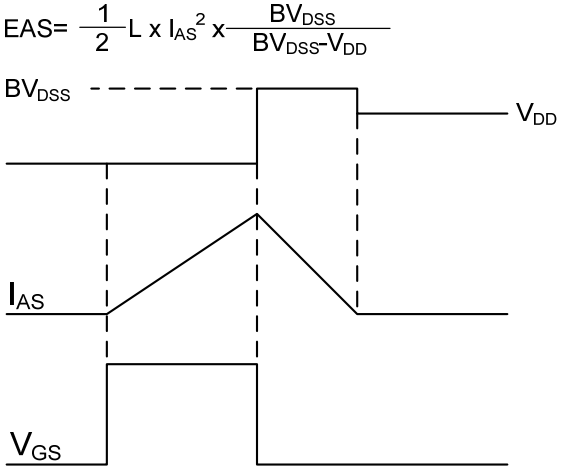


Fig.17 Unclamped Inductive Switching Waveform