

General Description

The HSW3004 is the high performance complementary N-ch and P-ch MOSFETs with high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The HSW3004 meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

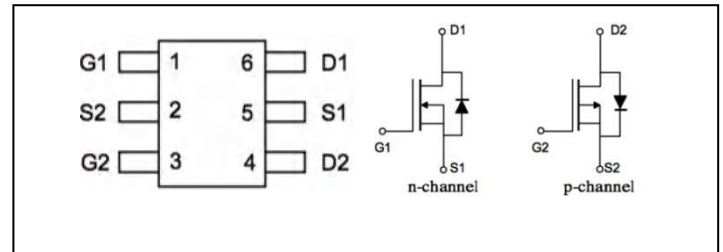
Features

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

Product Summary

BVDSS	RDSON,typ	ID
30V	28mΩ	4.0A
-30V	65mΩ	-4.0A

SOT23-6L Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-Ch	P-Ch	
V _{DS}	Drain-Source Voltage	30	-30	V
V _{GS}	Gate-Source Voltage	±12	±12	V
I _D @T _A =25°C	Continuous Drain Current	4.0	-4.0	A
I _D @T _A =75°C	Continuous Drain Current(Silicon Limited)	3.2	-3.2	A
I _{DM}	Pulsed Drain Current ²	16	-16	A
P _D @T _C =25°C	Total Power Dissipation ⁴	1.4	1.4	W
T _{STG}	Storage Temperature Range	-55 to 150	-55 to 150	°C
T _J	Operating Junction Temperature Range	-55 to 150	-55 to 150	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
R _{θJA}	Thermal Resistance Junction-Ambient ¹	---	125	°C/W
R _{θJC}	Thermal Resistance Junction-Case	---	80	°C/W

Note :

1.Surface mounted on 1" x 1" FR4 board,t≤10sec

2.Pulse width limited by maximum junction temperature



N-Channel Electrical Characteristics ($T_J=25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=250\mu A$	30	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance ¹	$V_{GS}=4.5V$, $I_D=4A$	---	28	35	$m\Omega$
		$V_{GS}=2.5V$, $I_D=3A$	---	36	50	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	0.5	0.8	1.3	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=30V$, $V_{GS}=0V$, $T_J=25^{\circ}\text{C}$	---	---	1	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 12V$, $V_{DS}=0V$	---	---	± 100	nA
g_{fs}	Forward Transconductance ¹	$V_{DS}=5V$, $I_D=4A$	---	33	---	S
Q_g	Total Gate Charge (4.5V)	$V_{DS}=15V$, $V_{GS}=4.5V$, $I_D=4A$	---	6	---	nC
Q_{gs}	Gate-Source Charge		---	1.3	---	
Q_{gd}	Gate-Drain Charge		---	1.8	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=15V$, $V_{GS}=10V$, $R_G=3\Omega$, $R_L=2.6\Omega$	---	3	---	ns
T_r	Rise Time		---	2.5	---	
$T_{d(off)}$	Turn-Off Delay Time		---	25	---	
T_f	Fall Time		---	4	---	
C_{iss}	Input Capacitance	$V_{DS}=15V$, $V_{GS}=0V$, $f=1\text{MHz}$	---	630	---	pF
C_{oss}	Output Capacitance		---	76	---	
C_{rss}	Reverse Transfer Capacitance		---	55	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V$, $I_S=1A$, $T_J=25^{\circ}\text{C}$	---	---	1.2	V



P-Channel Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-30	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=-4.5V, I_D=-4A$	---	65	85	$m\Omega$
		$V_{GS}=-2.5V, I_D=-2A$	---	85	110	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-0.5	-0.8	-1.3	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=-30V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	-1	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0V$	---	---	± 100	nA
gfs	Forward Transconductance	$V_{DS}=-5V, I_D=-4A$	---	9	---	S
Q_g	Total Gate Charge (-4.5V)	$V_{DS}=-8V, V_{GS}=-4.5V, I_D=-3A$	---	8.2	---	nC
Q_{gs}	Gate-Source Charge		---	1.8	---	
Q_{gd}	Gate-Drain Charge		---	2.0	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=-15V, V_{GS}=-10V, R_G=6\Omega, R_L=3.6\Omega, I_D=-3A$	---	8	---	ns
T_r	Rise Time		---	5	---	
$T_{d(off)}$	Turn-Off Delay Time		---	26	---	
T_f	Fall Time		---	11	---	
C_{iss}	Input Capacitance	$V_{DS}=-15V, V_{GS}=0V, f=1\text{MHz}$	---	675	---	pF
C_{oss}	Output Capacitance		---	60	---	
C_{rss}	Reverse Transfer Capacitance		---	51	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{SD}	Diode Forward Voltage	$V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$	---	---	-1.2	V

Note :

- 1.Pulse test: pulse width $\leq 300\mu s$, duty $\leq 2\%$
- 2.Guaranteed by design, not subject to production testing



N-Channel Typical Characteristics

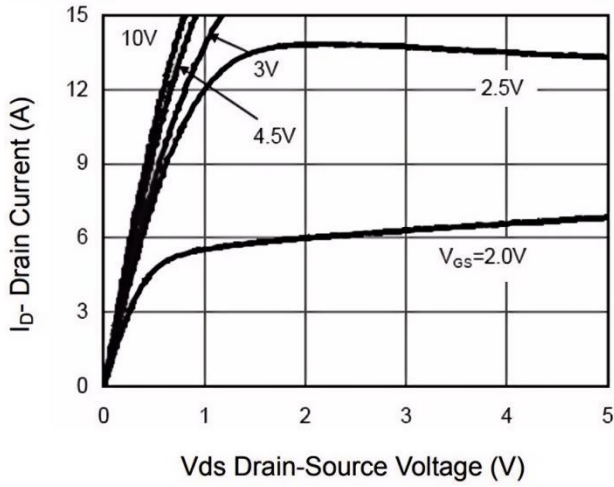


Fig.1 Output Characteristic

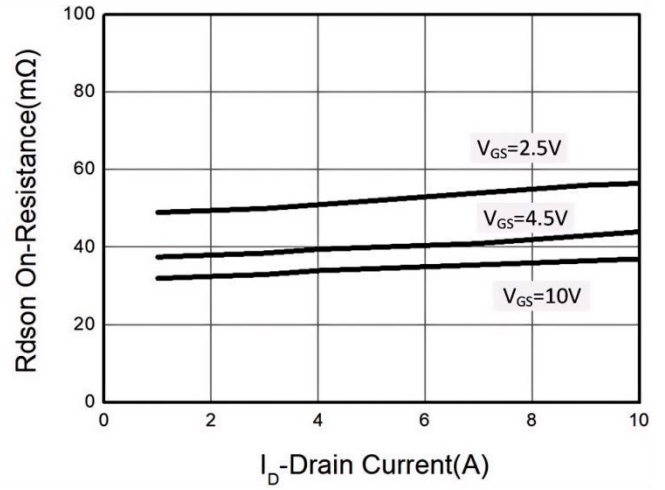


Fig.2 On-Resistance vs. Drain Current

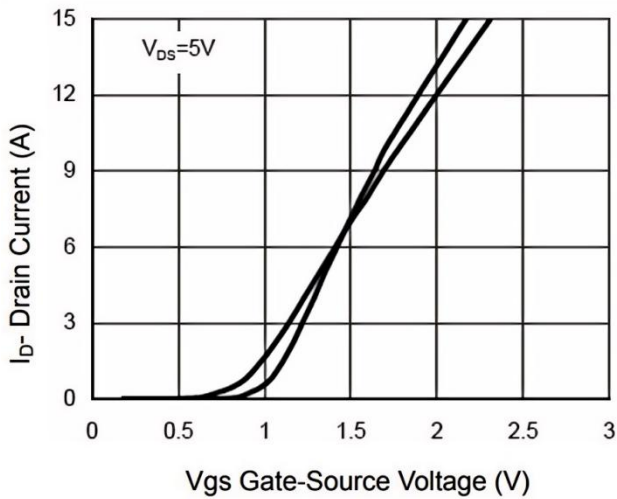


Fig.3 Transfer Characteristic

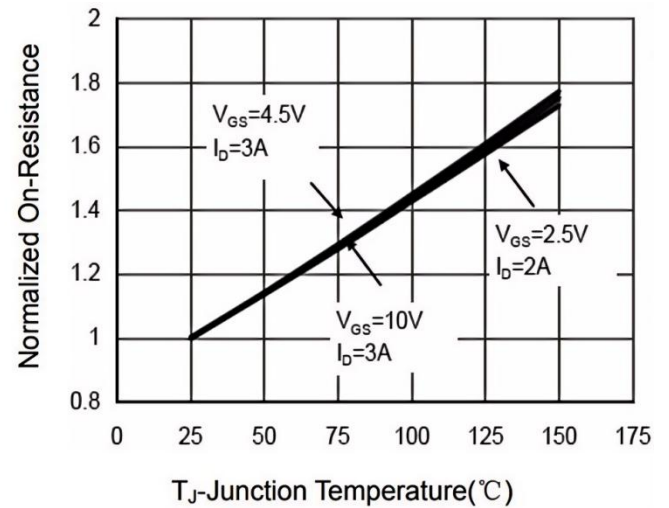


Fig.4 On-Resistance vs. Junction Temperature

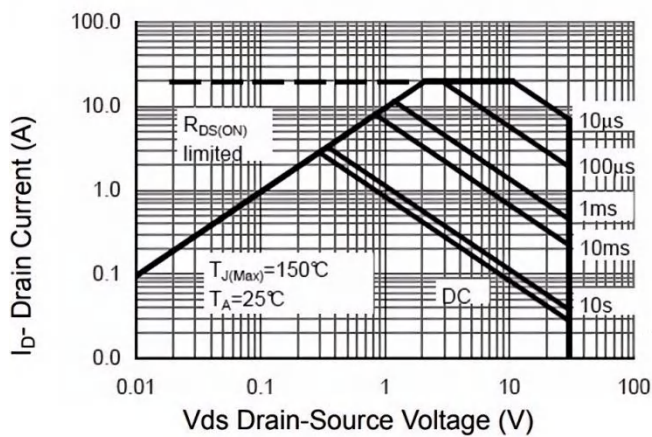


Fig.5 Safe Operation Area

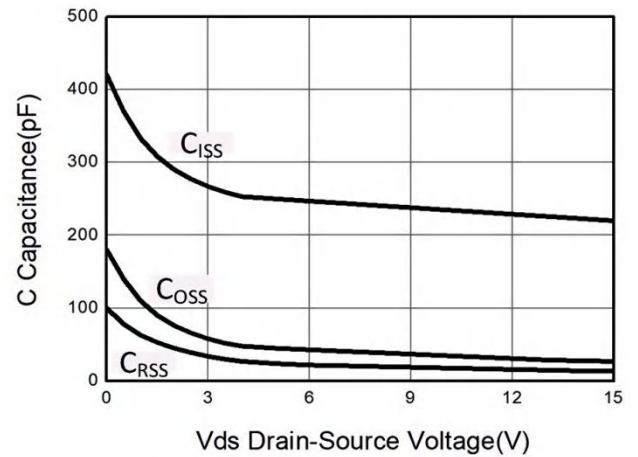


Fig.6 Capacitance Characteristic



N-Ch and P-Ch Fast Switching MOSFETs

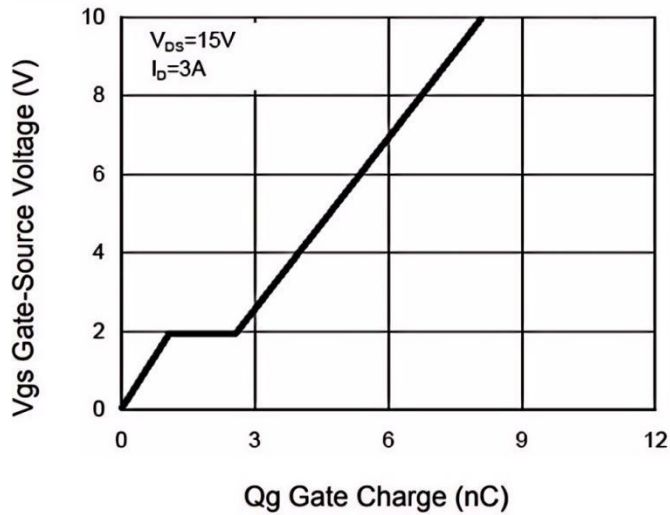


Fig.7 Gate-Charge Characteristic

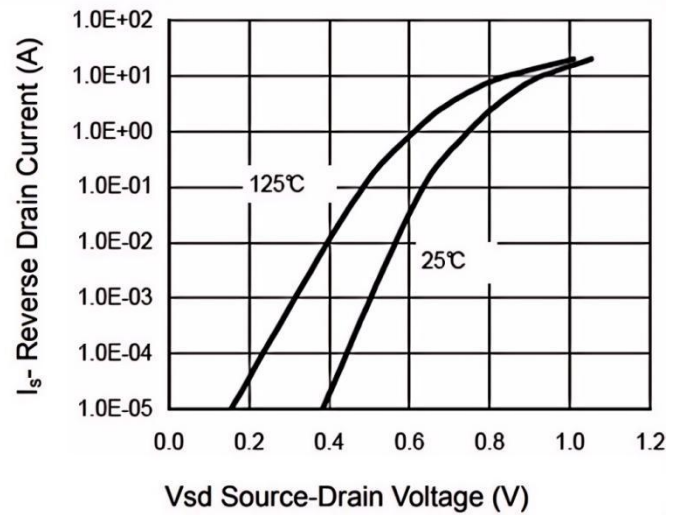


Fig.8 Body Diode Characteristic

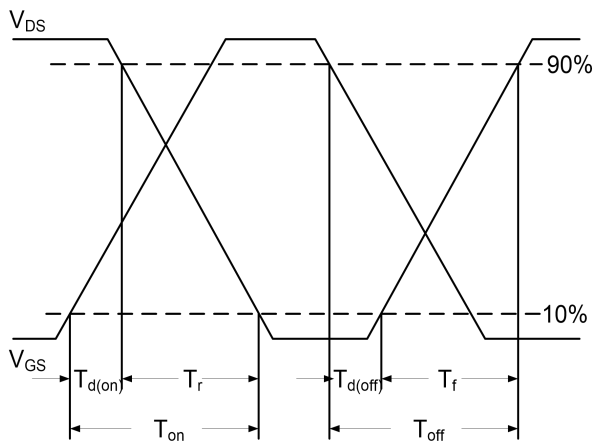


Fig.9 Switching Time Waveform

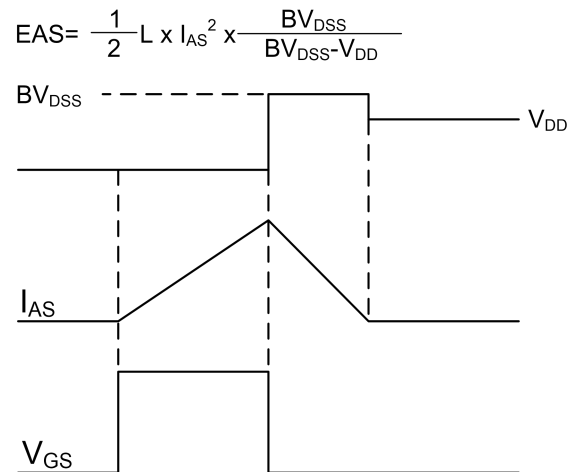


Fig.10 Unclamped Inductive Waveform



P-Channel Typical Characteristics

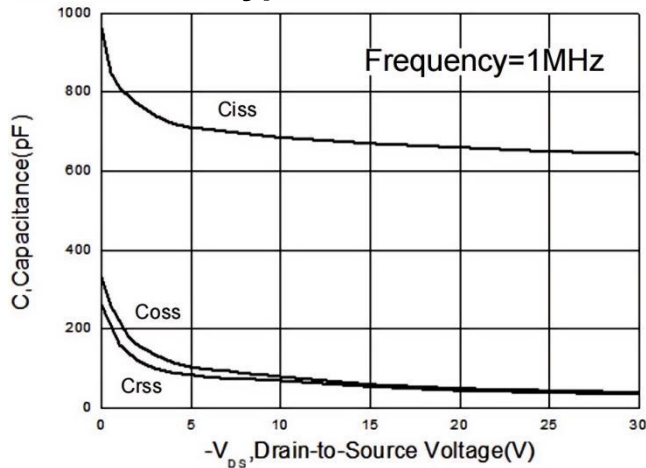


Fig.1 Capacitance Characteristic

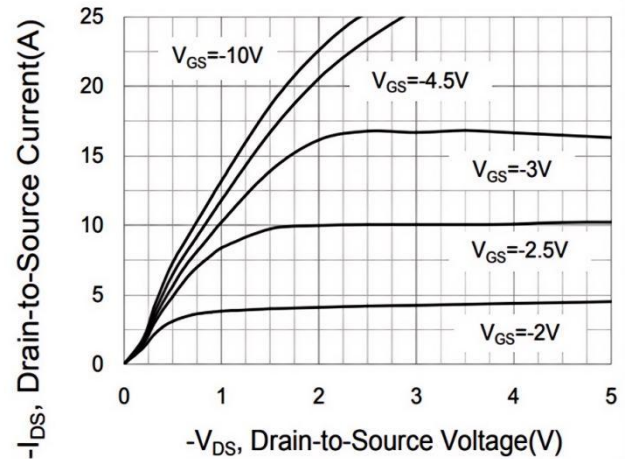


Fig.2 Output Characteristic

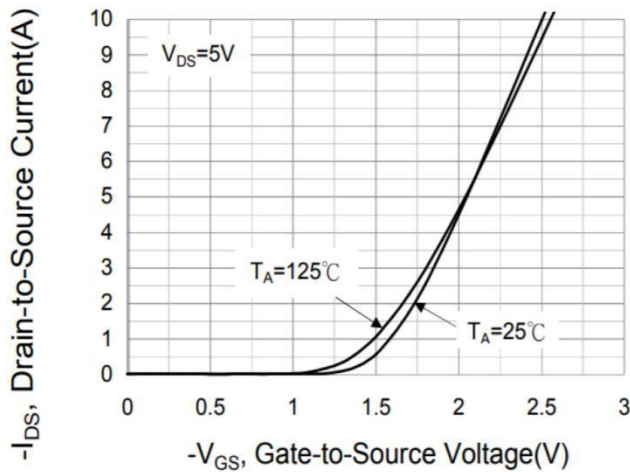


Fig.3 Transfer Characteristic

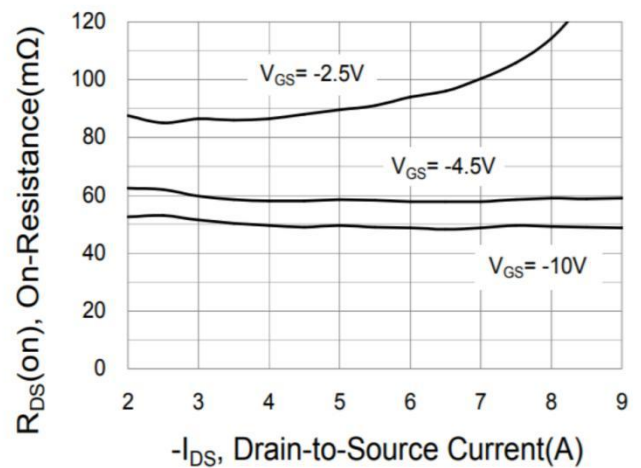


Fig.4 On-Resistance vs. Drain Current

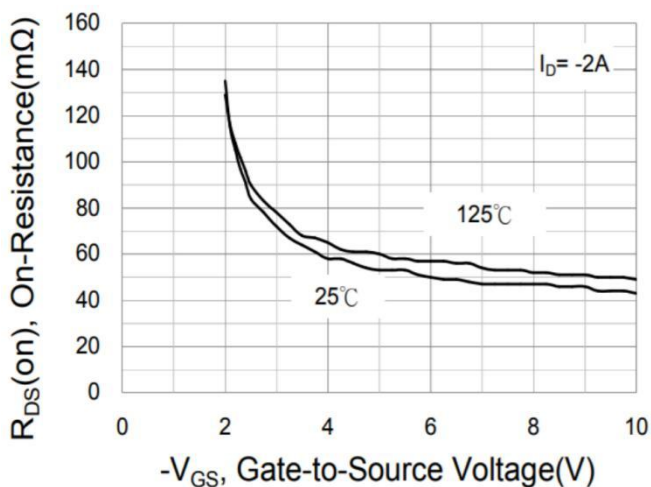


Fig.5 On-Resistance vs. VGS

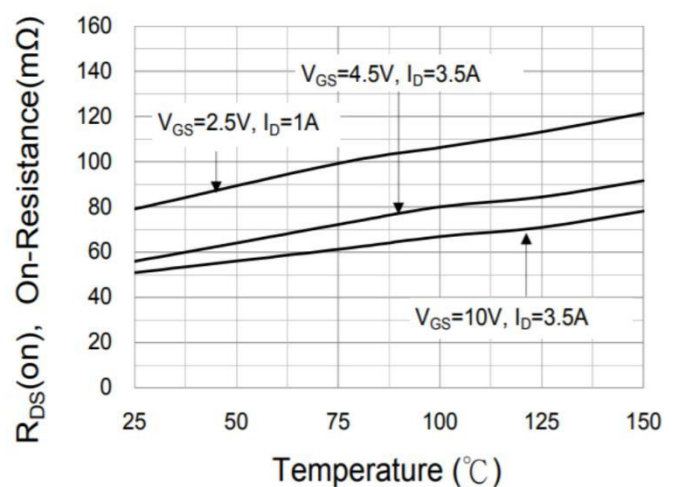


Fig.6 On-Resistance vs. Junction Temperature



N-Ch and P-Ch Fast Switching MOSFETs

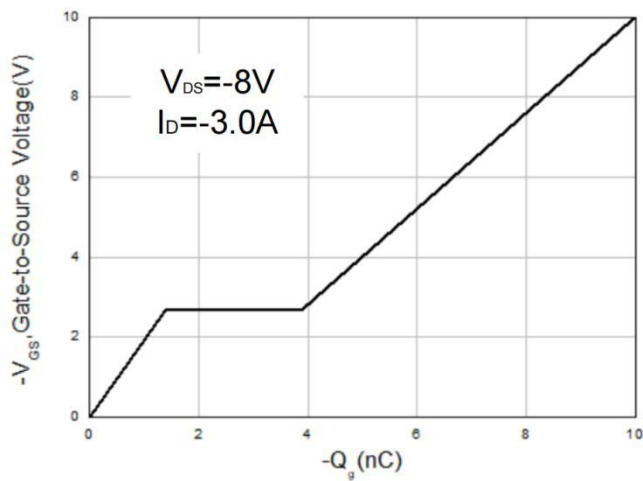


Fig.7 Gate-Charge Characteristic

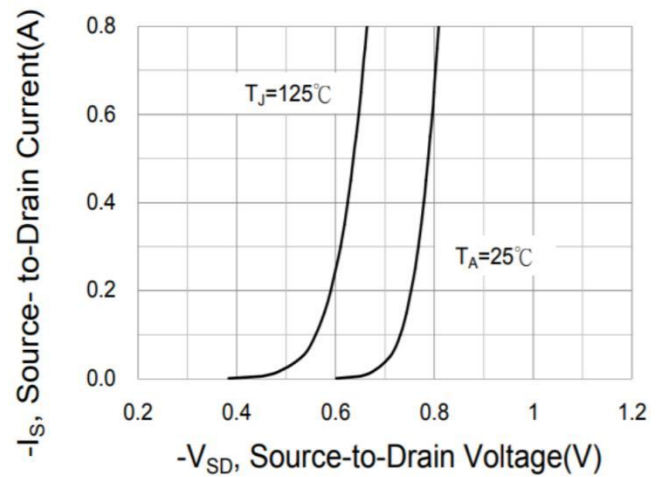


Fig.8 Body Diode Characteristic

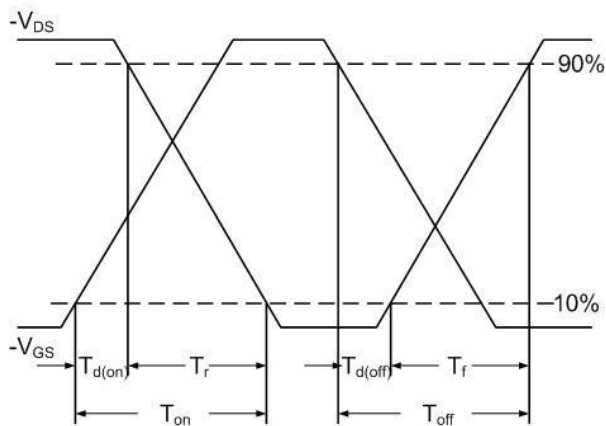


Fig.9 Switching Time Waveform

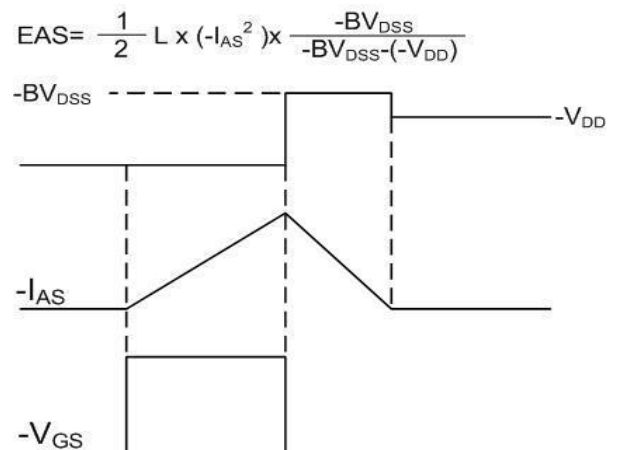


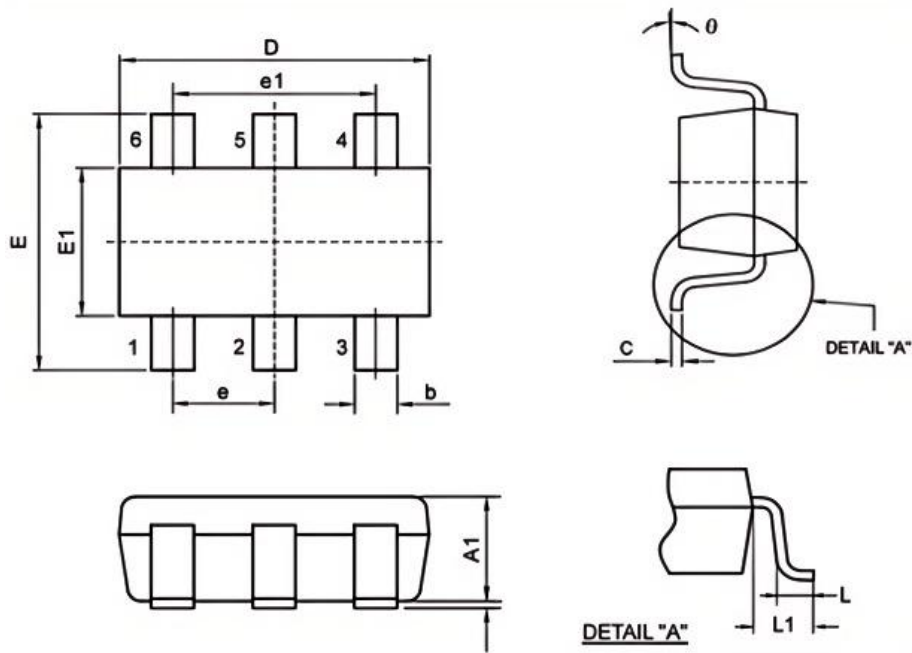
Fig.10 Unclamped Inductive Waveform



Ordering Information

Part Number	Package code	Packaging
HSW3004	SOT23-6L	3000/Tape&Reel

SOT23-6L Package Outline



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
D	2.692	3.099	0.106	0.122
E	2.591	3.000	0.102	0.118
E1	1.397	1.803	0.055	0.071
e	0.950 REF.		0.037 REF.	
e1	1.900 REF.		0.075 REF.	
b	0.300	0.500	0.012	0.020
C	0.080	0.200	0.003	0.008
A	0.000	0.100	0.000	0.004
A1	0.700	1.200	0.028	0.048
L	0.300	0.600	0.012	0.024
L1	0.600 REF.		0.023 REF.	
θ	0°	9°	0°	9°



HSW3004 TOP Marking

