

**General Description**

The CSN7S036 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 CSN7S036 meet the RoHS and Halogen-free 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
- 100% EAS Guaranteed
- Halogen-Free Device Available

**Absolute Maximum Ratings**

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

**Thermal Data**

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient (Steady State) <sup>1</sup>	---	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	3.6	$^\circ C/W$

**Product Summary**

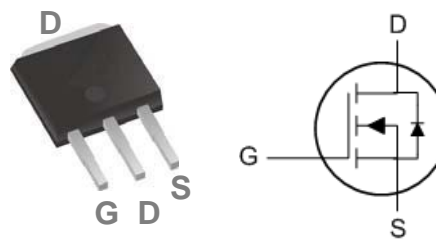
**Halogen-Free**

BVDSS	RDSON	ID
30V	8.5m $\Omega$	55A

**Applications**

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

**TO251S Pin Configuration**



**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
$\Delta BV_{DSS}/\Delta T_J$	BVDSS Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_D=1mA$	---	0.027	---	V/ $^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{GS}=10V, I_D=30A$	---	7.5	8.5	m $\Omega$
		$V_{GS}=4.5V, I_D=15A$	---	11	14	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	1.5	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5.8	---	mV/ $^\circ\text{C}$
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=30V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	$\mu A$
		$V_{DS}=30V, V_{GS}=0V, T_J=55^\circ\text{C}$	---	---	5	
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	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	$\Omega$
$Q_g$	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	$V_{DD}=15V, V_{GS}=10V, R_G=3.3\Omega, I_D=15A$	---	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 <sup>5</sup>	$V_{DD}=25V, L=0.1mH, I_{AS}=20A$	45	---	---	mJ

**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current <sup>1,6</sup>	$V_G=V_D=0V, \text{Force Current}$	---	---	55	A
$I_{SM}$	Pulsed Source Current <sup>2,6</sup>		---	---	110	A
$V_{SD}$	Diode Forward Voltage <sup>2</sup>	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F=30A, dI/dt=100A/\mu s, T_J=25^\circ\text{C}$	---	9.2	---	nS
$Q_{rr}$	Reverse Recovery Charge		---	2	---	nC

Note :

- The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- The data tested by pulsed, pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
- The EAS data shows Max. rating. The test condition is  $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=34A$
- The power dissipation is limited by  $175^\circ\text{C}$  junction temperature
- The Min. value is 100% EAS tested guarantee.
- The data is theoretically the same as  $I_D$  and  $I_{DM}$ , in real applications, should be limited by total power dissipation.

Typical Characteristics

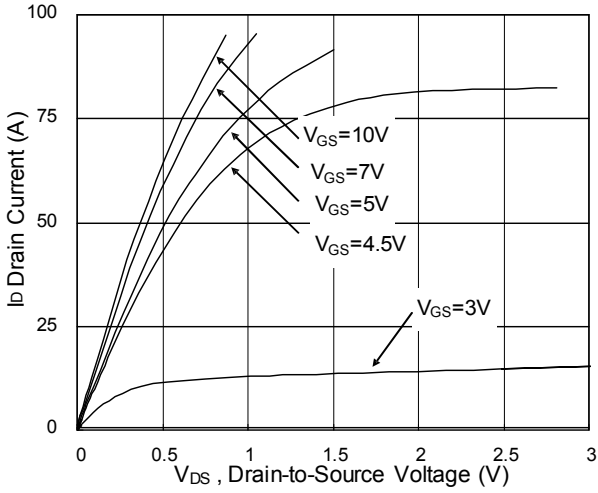


Fig.1 Typical Output Characteristics

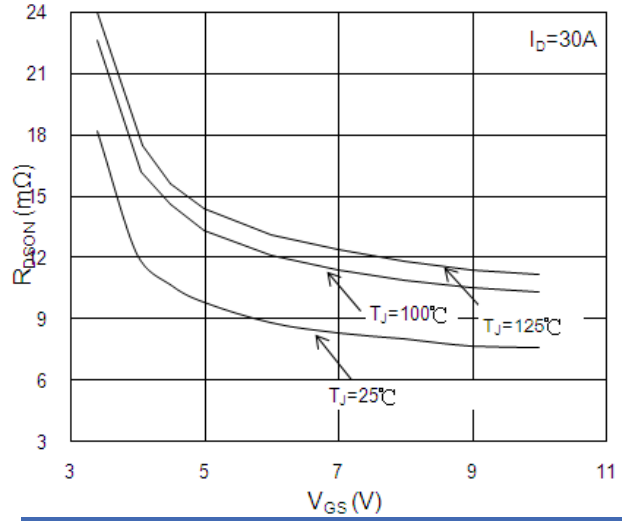


Fig.2 On-Resistance vs. G-S Voltage

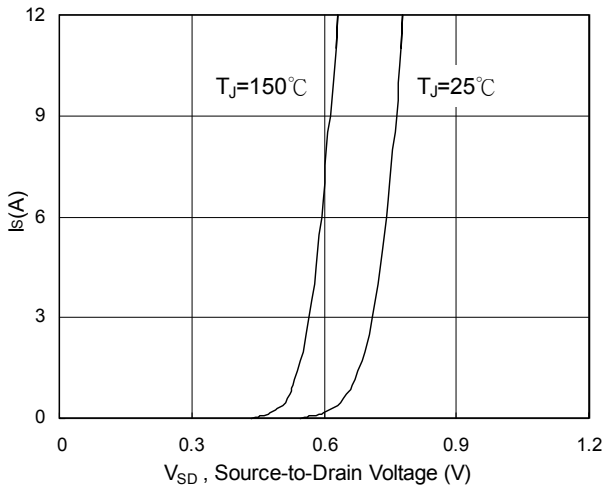


Fig.3 Forward Characteristics of Reverse

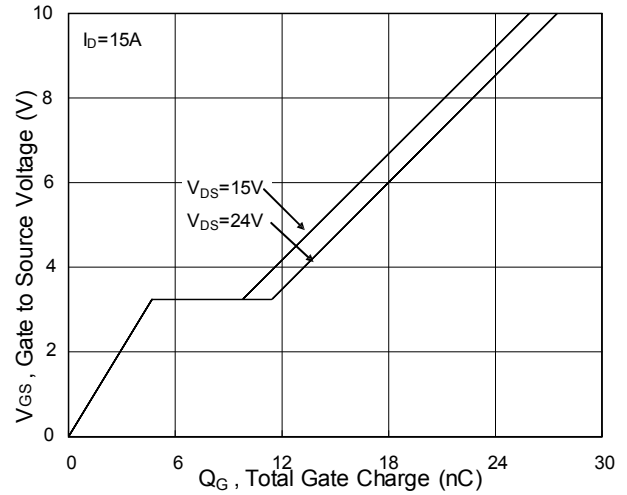


Fig.4 Gate-Charge Characteristics

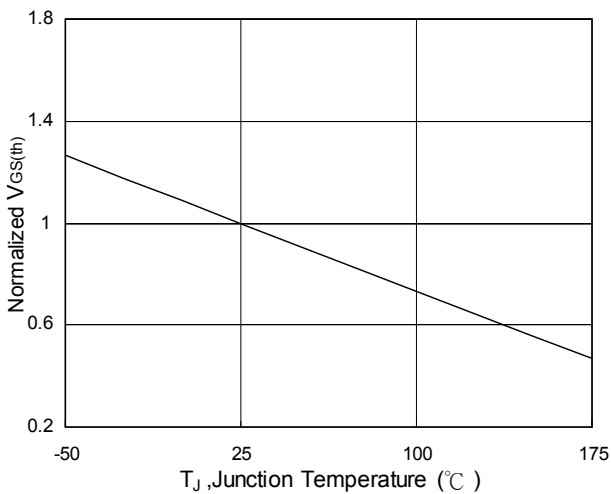


Fig.5 Normalized V<sub>GS(th)</sub> vs. T<sub>J</sub>

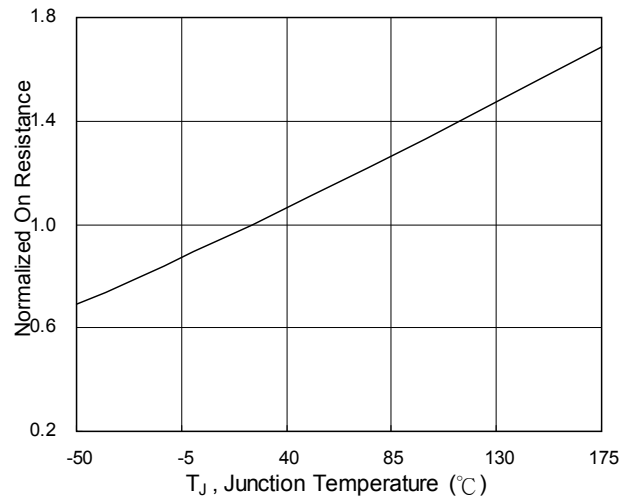
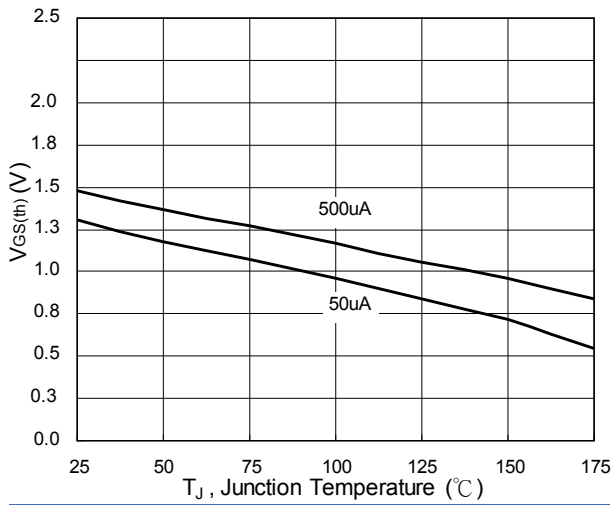
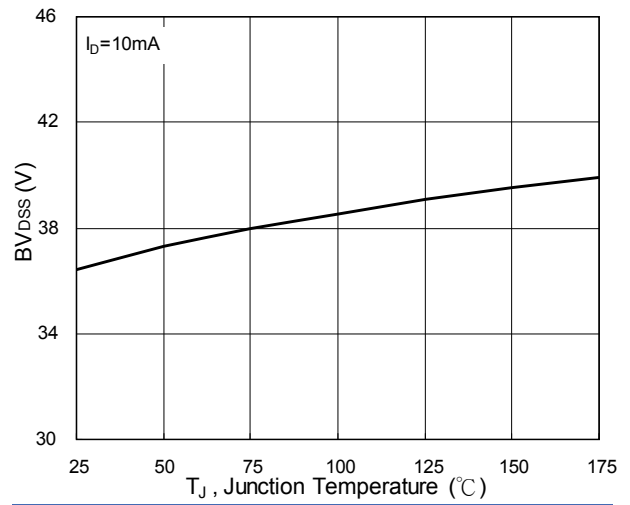


Fig.6 Normalized R<sub>DS(on)</sub> vs. T<sub>J</sub>

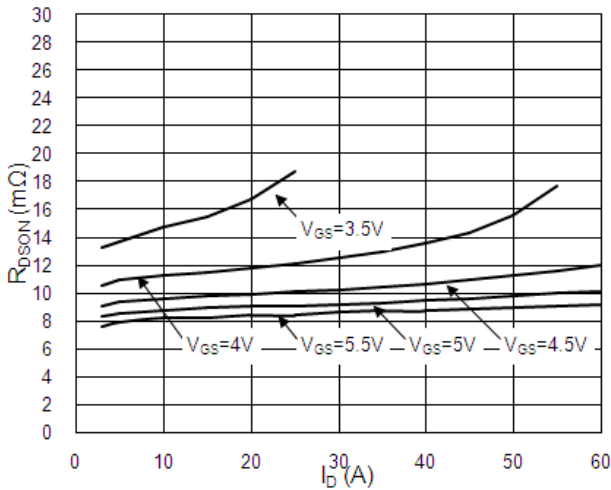
**N-Ch 30V Fast Switching MOSFETs**



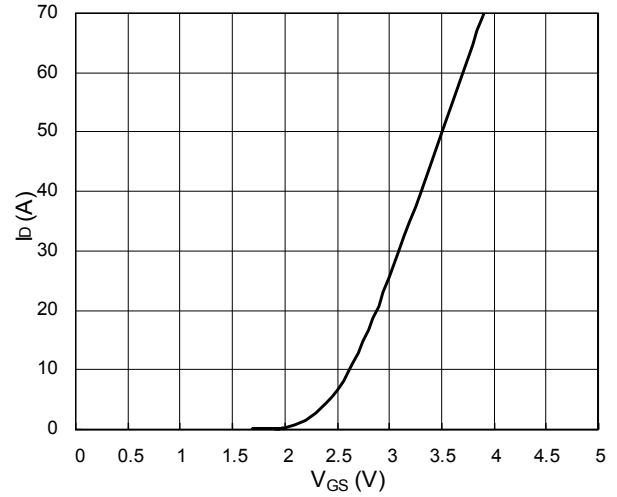
**Fig.7  $V_{GS(th)}$  vs.  $T_J$**



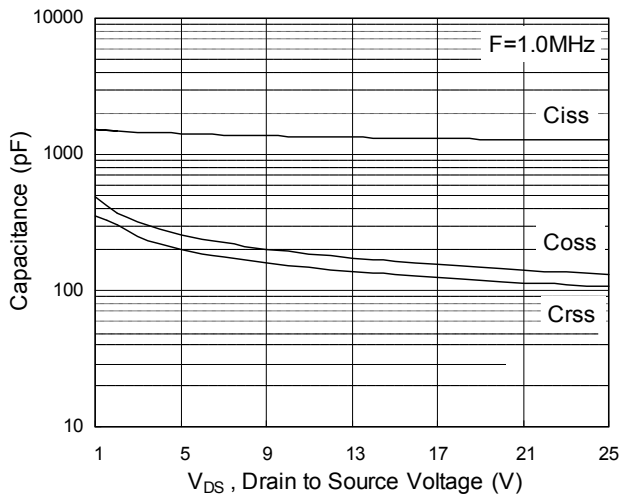
**Fig.8  $BV_{DSS}$  vs.  $T_J$**



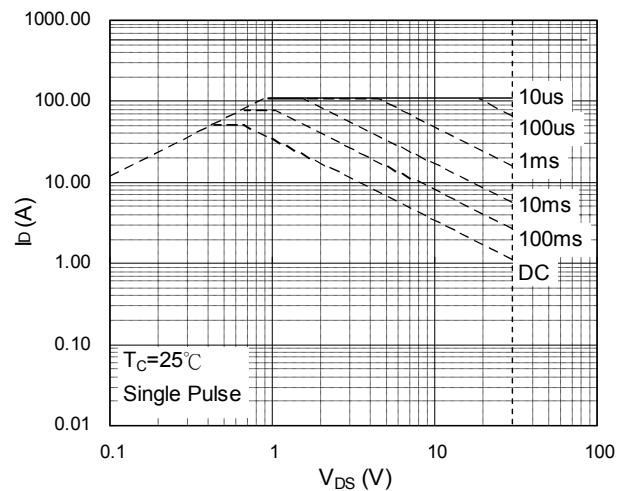
**Fig.9 On-Resistance vs. Drain Current**



**Fig.10 Transfer Characteristics**

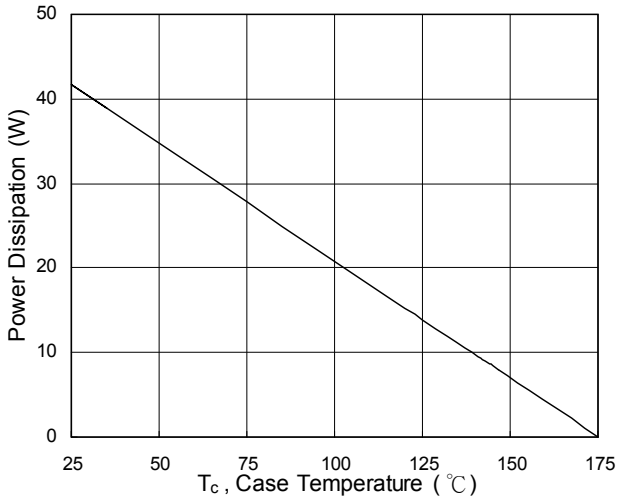


**Fig.11 Capacitance**

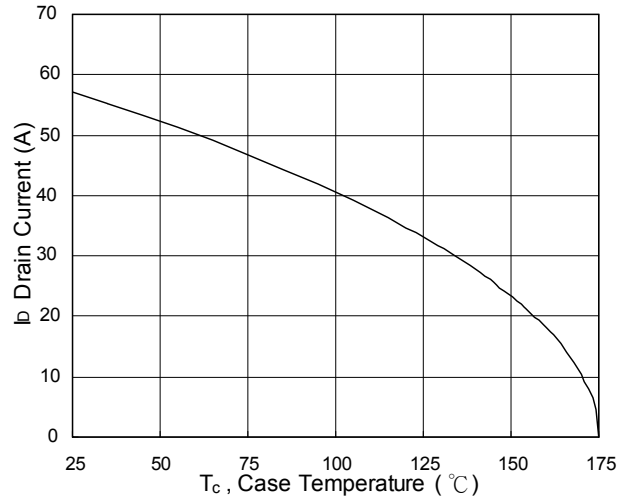


**Fig.12 Safe Operating Area**

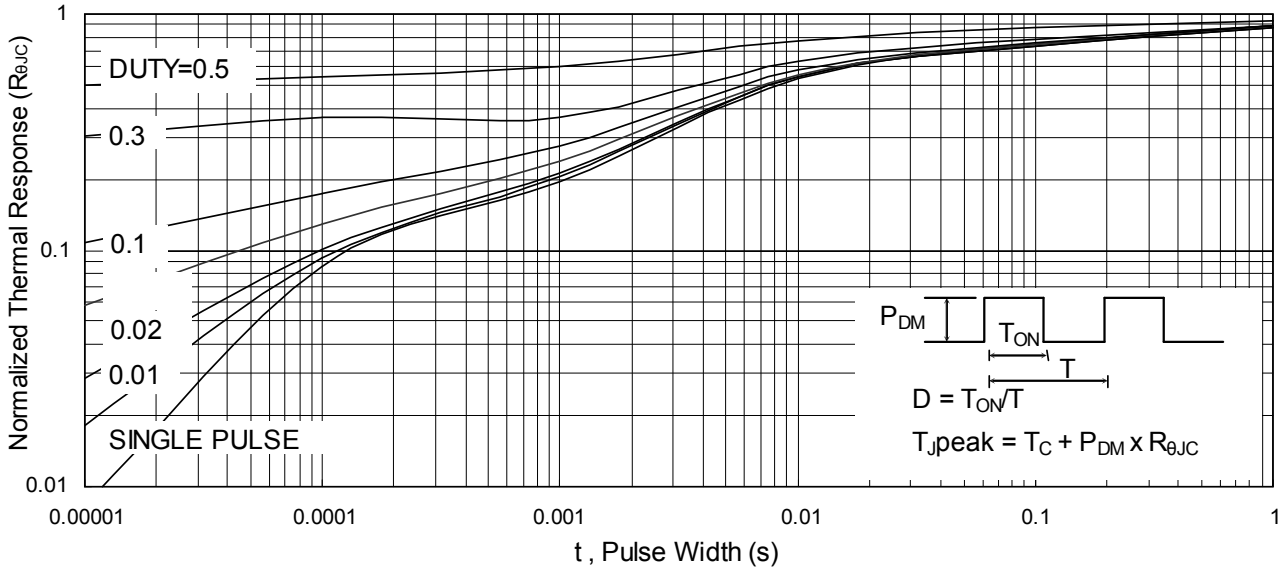
**N-Ch 30V Fast Switching MOSFETs**



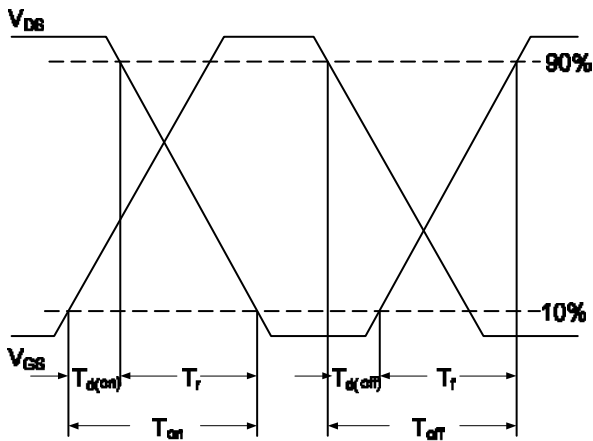
**Fig.13 Power Derating**



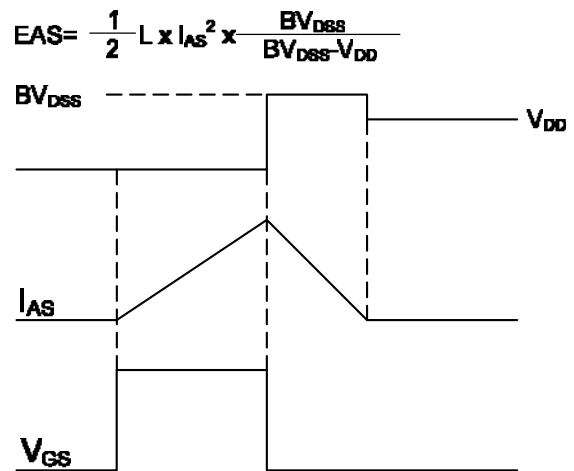
**Fig.14 Current Derating**



**Fig.15 Normalized Maximum Transient Thermal Impedance**



**Fig.16 Switching Time Waveform**



**Fig.17 Unclamped Inductive Switching Waveform**