WSF3013B

N-Ch and P-Channel MOSFET

General Description

The WSF3013B is the highest performance trench N-ch and P-ch MOSFETs with extreme high cell density , which provide excellent RDSON and gate charge for most of the synchronous buck converter applications .

The WSF3013B meet the RoHS and Green 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
- Green Device Available

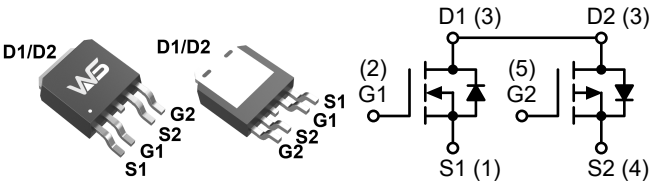
Product Summery

BVDSS	RDSON	ID
30V	15mΩ	22A
-30V	25mΩ	-19A

Applications

- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- CCFL Back-light Inverter

TO-252-4L 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	±20	±20	V
I_D	Continuous Drain Current, $V_{GS(NP)}$=10V,T_c=25℃	22	-19	A
	Continuous Drain Current, $V_{GS(NP)}$=10V,T_c=100℃	10	-8	A
I_{DP} [a]	Pulse Drain Current Tested, $V_{GS(NP)}$=10V	52	-45	A
E_{AS} [c]	Avalanche Energy, Single pulse , L=0.5mH	22	45	mJ
I_{AS} [c]	Avalanche Current, Single pulse , L=0.5mH	21	-30	A
P_D	Total Power Dissipation, T_c=25℃	18	18	W
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	℃
T_J	Operating Junction Temperature Range	150	150	℃
$R_{\theta JA}$ [b]	Thermal Resistance-Junction to Ambient,Steady State	62	62	℃/W
$R_{\theta JC}$	Thermal Resistance-Junction to Case,Steady State	5.0	5.0	℃/W

Note * : Max. current is limited by bonding wire.
Note a : Pulse width limited by max. junction temperature.
Note b : $R_{\theta JA}$ steady state t=999s. $R_{\theta JA}$ is measured with the device mounted on 1in^2, FR-4 board with 2oz. Copper.
Note c : UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature T_j=25°C).

N-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
$R_{DS(ON)}$[d]	Static Drain-Source On-Resistance	V_{GS}=10V , I_D=10A	---	15	22	mΩ
		V_{GS}=4.5V , I_D=5A	---	20	30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.0	1.6	2.5	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=20V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=20V , V_{GS}=0V , T_J=85℃	---	---	30	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	2.5	5.0	Ω
Q_g[e]	Total Gate Charge	V_{DS}=20V, V_{GS}=4.5V, I_{DS}=10A	---	7.2	---	nC
Q_{gs}[e]	Gate-Source Charge		---	1.4	---	
Q_{gd}[e]	Gate-Drain Charge		---	2.2	---	
$T_{d(on)}$[e]	Turn-On Delay Time	V_{DD}=15V, I_{DS}=5A,V_{GS}=10V, R_G=3.3R.	---	4.1	---	ns
T_r[e]	Rise Time		---	9.8	---	
$T_{d(off)}$[e]	Turn-Off Delay Time		---	15.5	---	
T_f[e]	Fall Time		---	6.0	---	
C_{iss}[e]	Input Capacitance	V_{DS}=15V , V_{GS}=0V , f=1MHz	---	572	---	pF
C_{oss}[e]	Output Capacitance		---	81	---	
C_{rss}[e]	Reverse Transfer Capacitance		---	65	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	10	A
V_{SD}[d]	Diode Forward Voltage	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1.2	V

Note d：Pulse test ; pulse width≤300μs, duty cycle≤2%.
Note e：Guaranteed by design, not subject to production testing.

P-Channel 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
$R_{DS(ON)}$[d]	Static Drain-Source On-Resistance	V_{GS}=-10V , I_D=-7A	---	25	33	mΩ
		V_{GS}=-4.5V , I_D=-5A	---	37	54	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1.0	---	-2.8	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-20V , V_{GS}=0V , T_J=25℃	---	---	-1	uA
		V_{DS}=-20V , V_{GS}=0V , T_J=85℃	---	---	-30	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
Q_g[e]	Total Gate Charge	V_{DS}=-15V , V_{GS}=-4.5V , I_D=-12A	---	9.8	---	nC
Q_{gs}[e]	Gate-Source Charge		---	2.2	---	
Q_{gd}[e]	Gate-Drain Charge		---	3.4	---	
$T_{d(on)}$[e]	Turn-On Delay Time	V_{DD}=-15V , V_{GS}=-10V , R_G=6Ω, I_D=-1A ,R_L=15Ω,	---	16.4	---	ns
T_r[e]	Rise Time		---	20.2	---	
$T_{d(off)}$[e]	Turn-Off Delay Time		---	55	---	
T_f[e]	Fall Time		---	10	---	
C_{iss}[e]	Input Capacitance	V_{DS}=-15V , V_{GS}=0V , f=1MHz	---	930	---	pF
C_{oss}[e]	Output Capacitance		---	148	---	
C_{rss}[e]	Reverse Transfer Capacitance		---	115	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	-8	A
V_{SD}[e]	Diode Forward Voltage	V_{GS}=0V , I_S=-1A , T_J=25℃	---	---	-1.2	V

Note d：Pulse test; pulse width≤300μs, duty cycle≤2%.
Note e：Guaranteed by design, not subject to production testing.

N-Channel Typical Characteristics

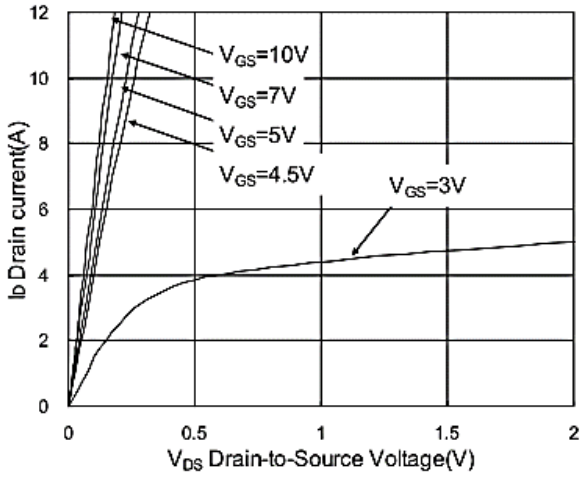


Fig.1 Typical Output Characteristics

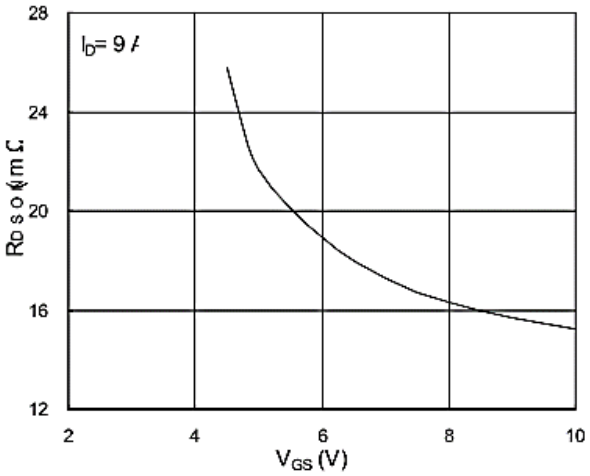


Fig.2 On-Resistance v.s Gate-Source

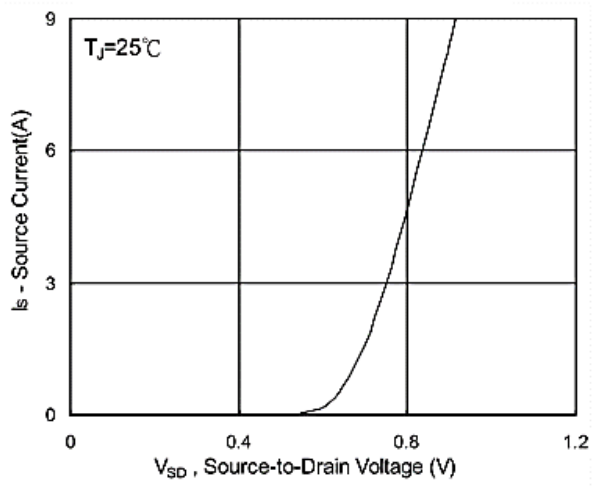


Fig.3 Forward Characteristics Of Reverse

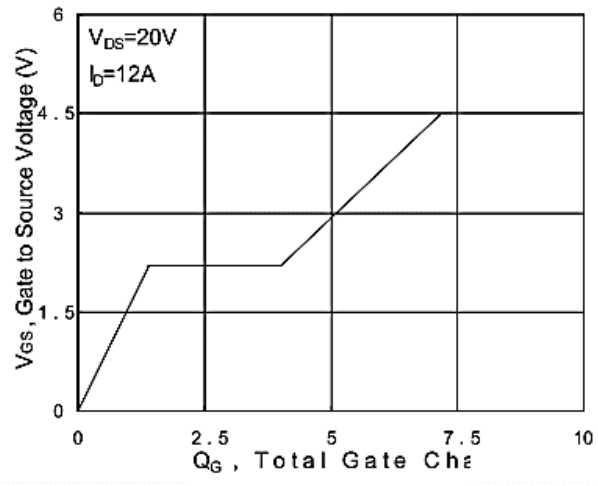


Fig.4 Gate-Charge characteristics

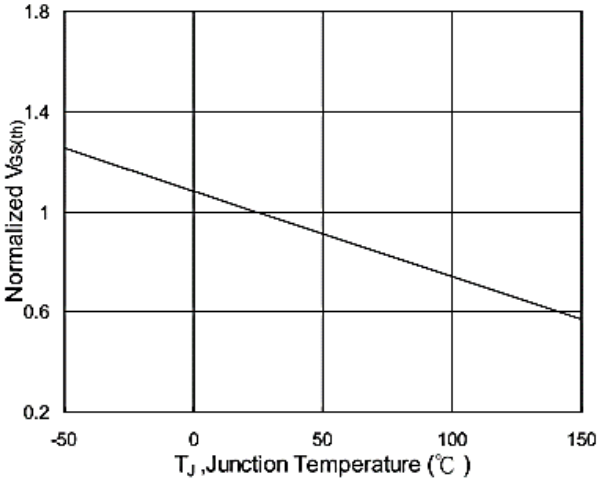


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

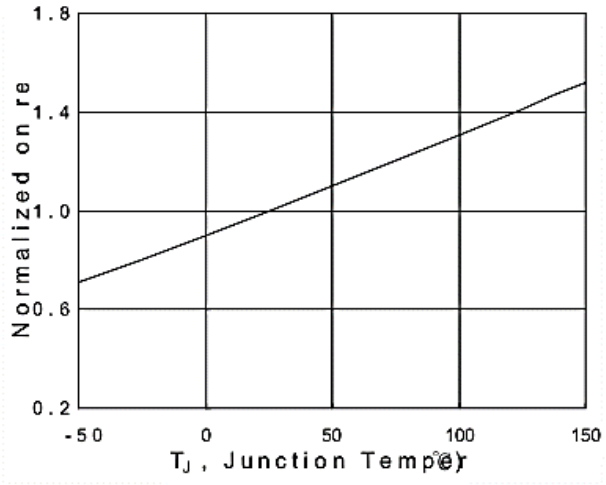


Fig.6 Normalized R_{DSON} v.s T_J

N-Channel Typical Characteristics

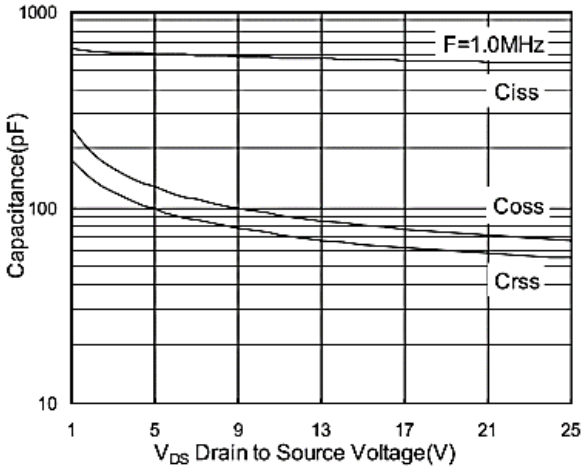


Fig.7 Capacitance

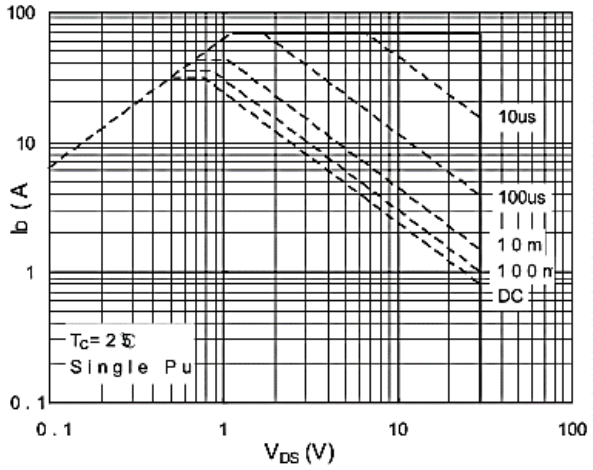


Fig.8 Safe Operating Area

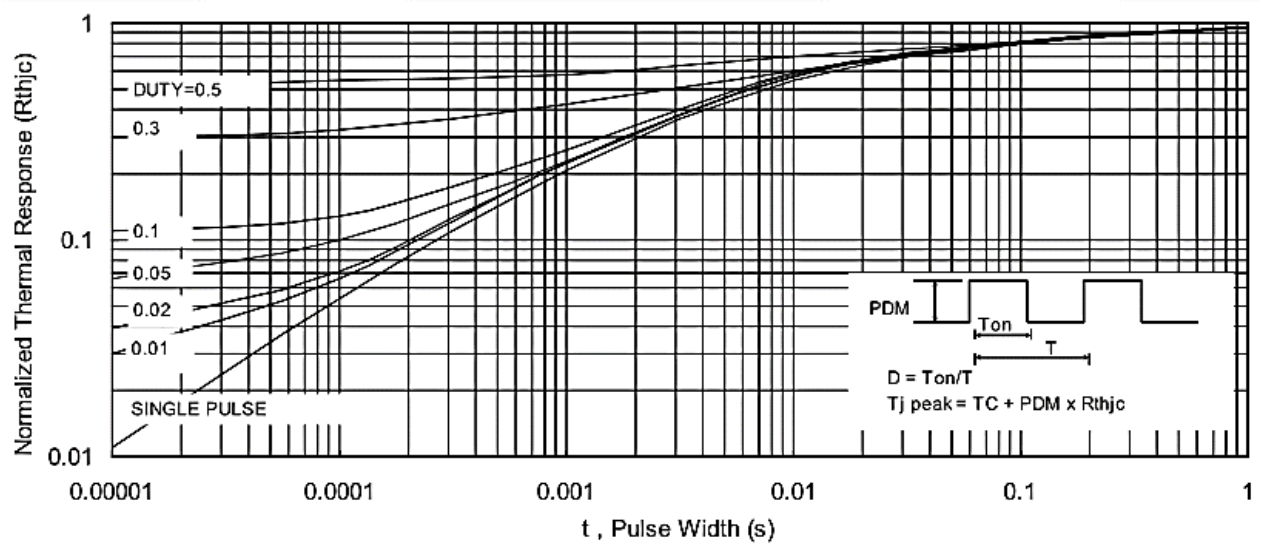


Fig.9 Normalized Maximum Transient Thermal Impedance

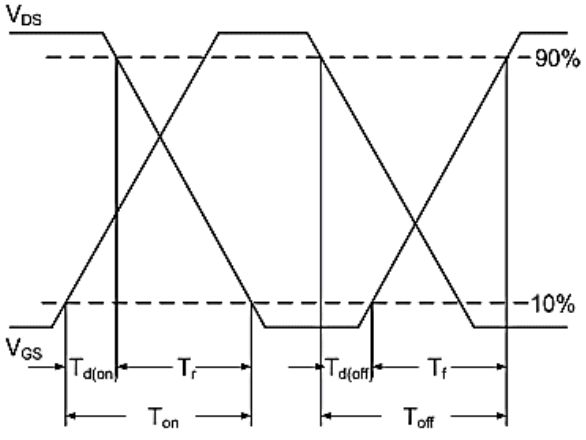


Fig.10 Switching Time Waveform

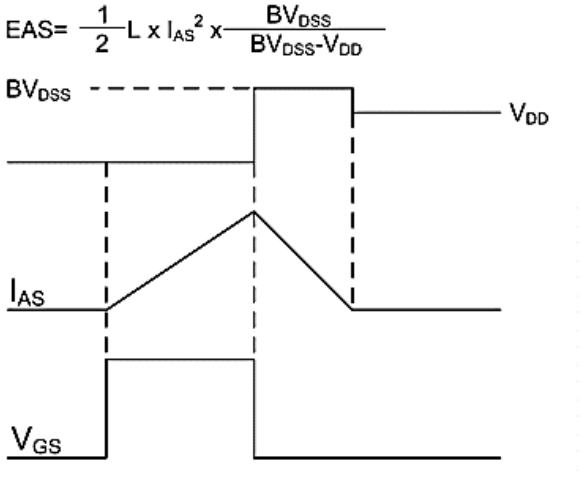


Fig.11 Unclamped Inductive Waveform

P-Channel Typical Characteristics

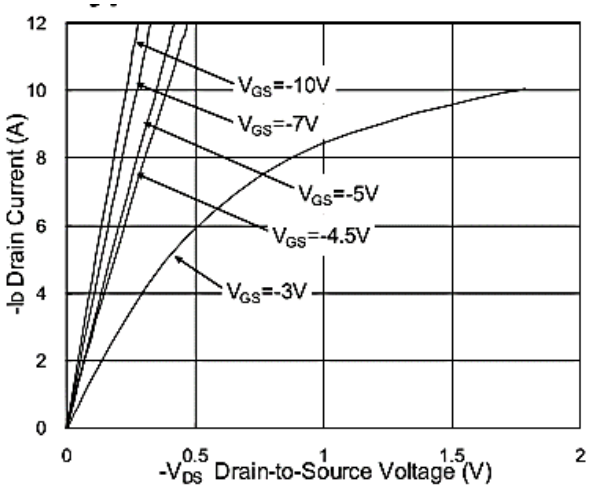


Fig.1 Typical Output Characteristics

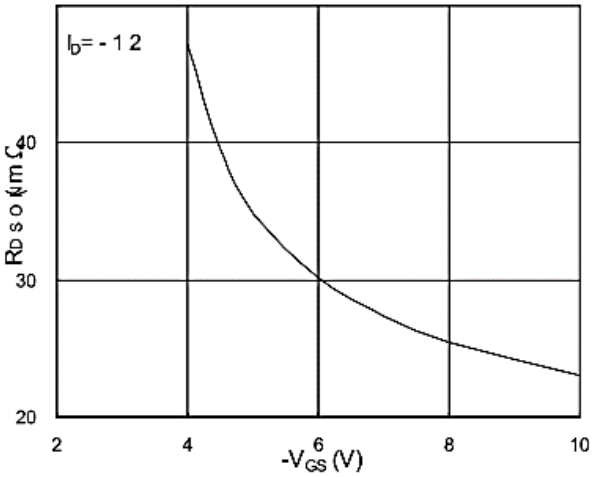


Fig.2 On-Resistance v.s Gate-Source

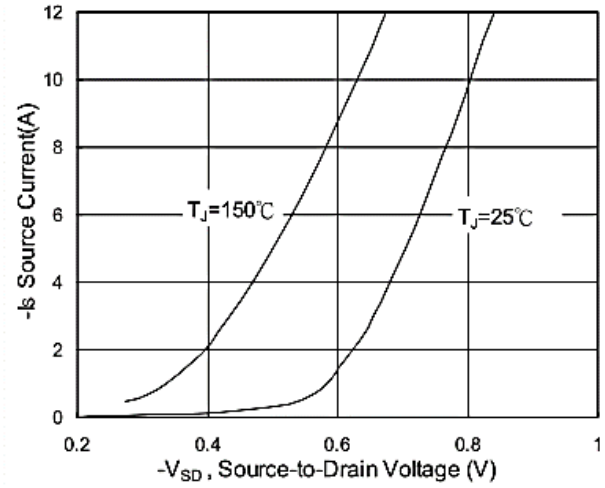


Fig.3 Forward Characteristics Of Reverse

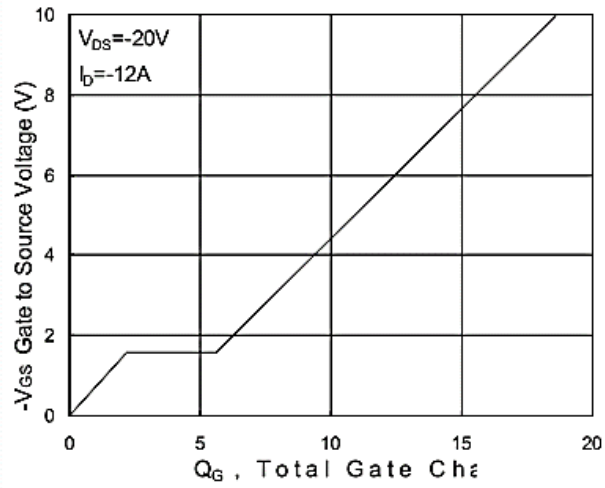


Fig.4 Gate-Charge Characteristics

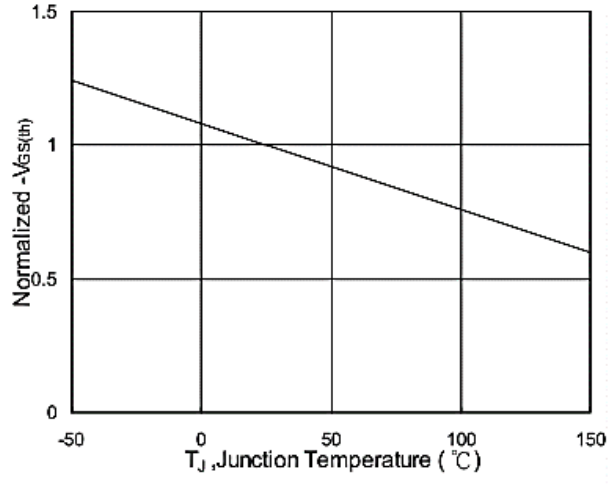


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

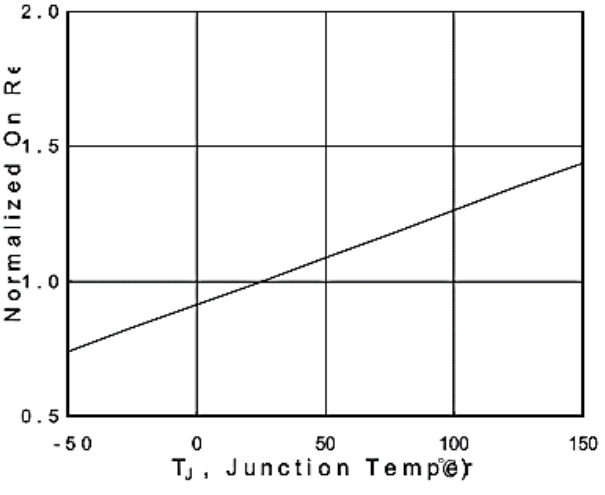


Fig.6 Normalized R_{DSON} v.s T_J

P-Channel Typical Characteristics

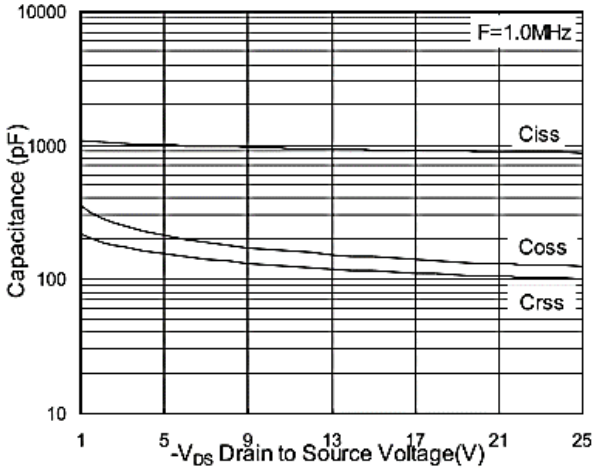


Fig.7 Capacitance

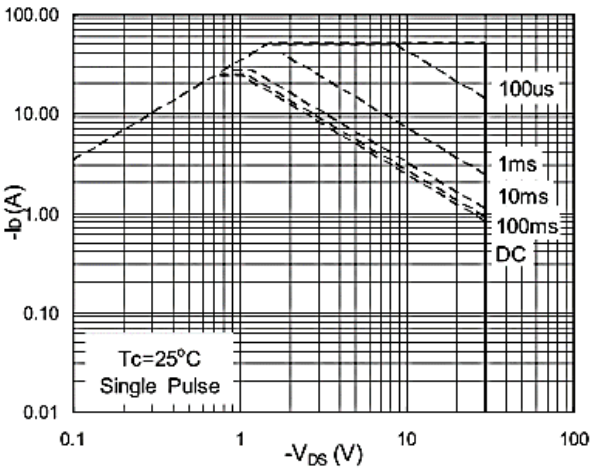


Fig.8 Safe Operating Area

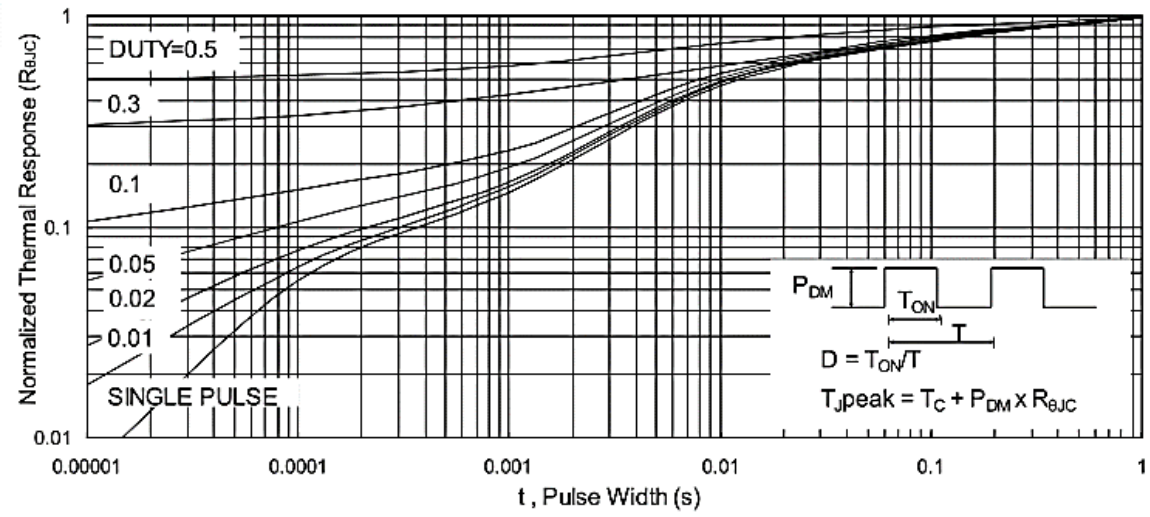


Fig.9 Normalized Maximum Transient Thermal Impedance

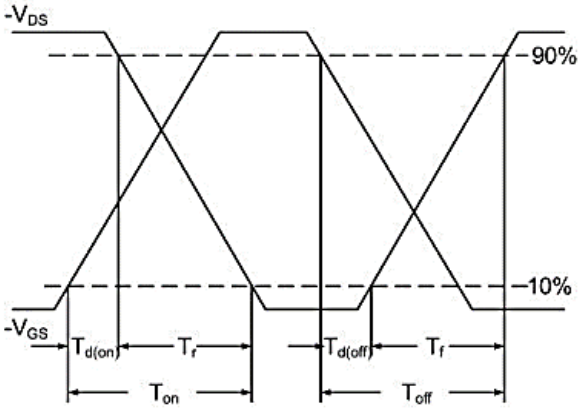


Fig.10 Switching Time Waveform

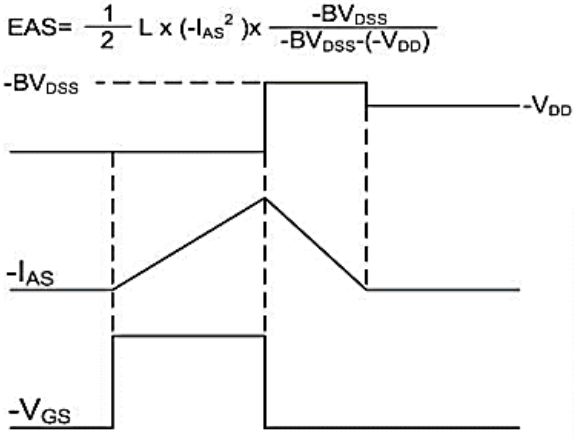
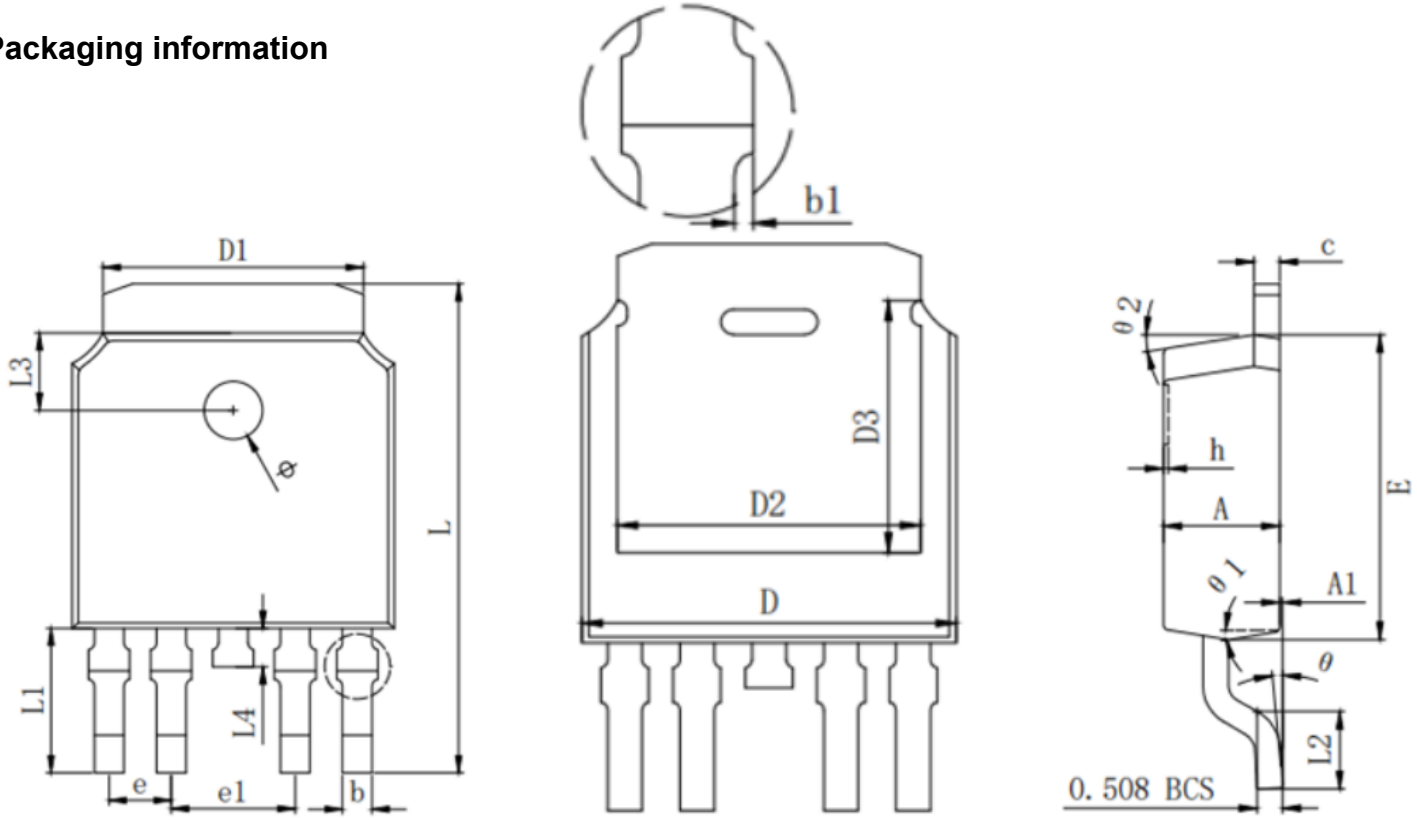


Fig.11 Unclamped Inductive Waveform

Packaging information



SYMBOLS	MILLIMETERS		
	MIN.	Typ.	MAX.
A	2.200	2.300	2.400
A1	0.000	-	0.127
b	0.550	0.600	0.650
b1	0.000	-	0.120
c(电镀后)	0.460	0.520	0.580
D	6.500	6.600	6.700
D1	5.334 REF		
D2	5.346 REF		
D3	4.490 REF		
E	6.000	6.100	6.200
e	1.270 TYP		
e1	2.540 TYP		
h	0.000	0.100	0.200
L	9.900	10.100	10.300
L1	2.988 REF		
L2	1.400	1.550	1.700
L3	1.600 REF		
L4	0.700	0.800	0.900
Φ	1.100	1.200	1.300
θ	0°	-	8°
θ 1	9° TYP		
θ 2	9° TYP		

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