WSF3015

N-Ch and P-Channel MOSFET

General Description

The WSF3015 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 WSF3015 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

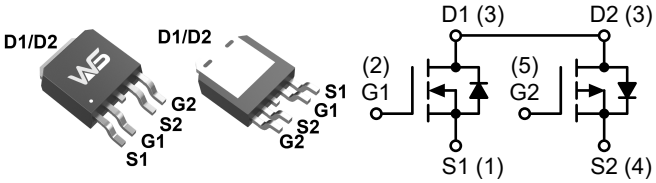
Product Summery

BV_{DSS}	R_{DSON}	I_D
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-Channel Electrical Characteristics (T_J= 25ÁC 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= 25ÁC 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

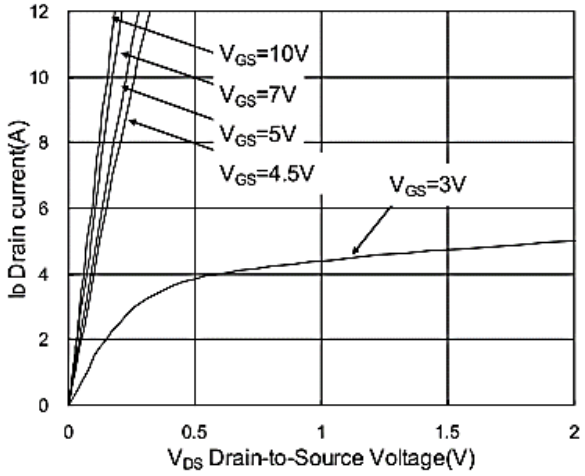


Fig.1 Typical Output Characteristics

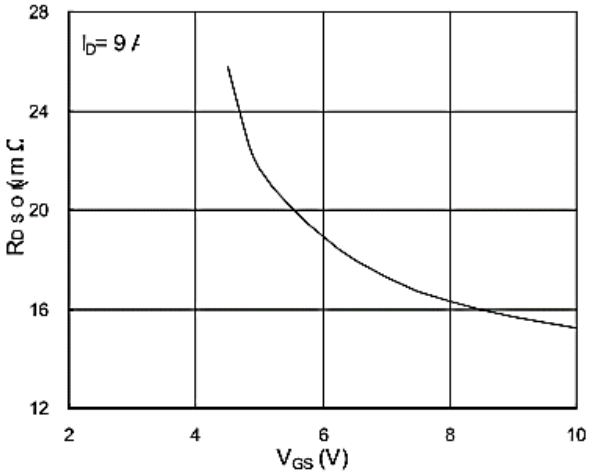


Fig.2 On-Resistance v.s Gate-Source

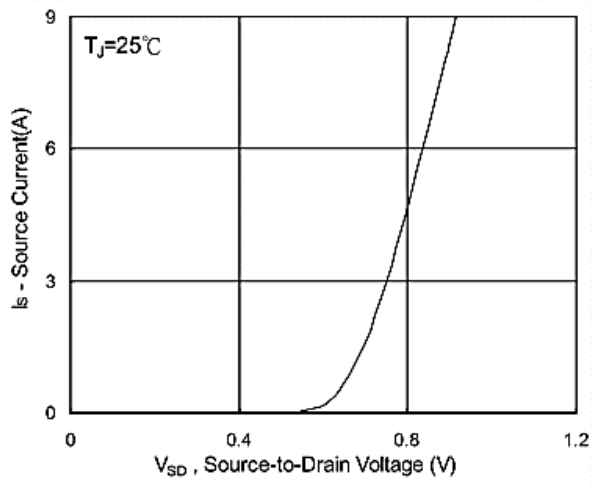


Fig.3 Forward Characteristics Of Reverse

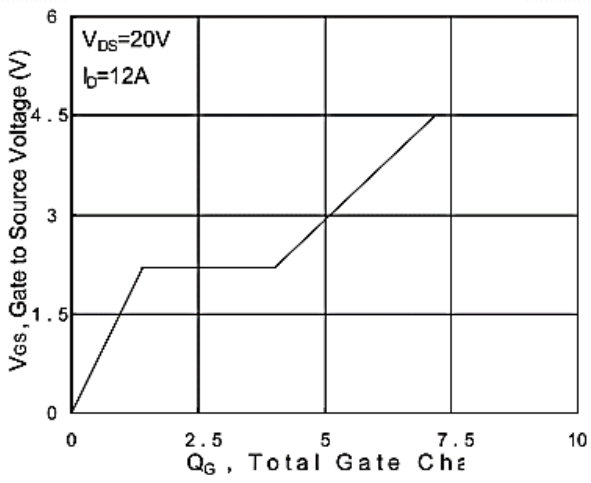


Fig.4 Gate-Charge characteristics

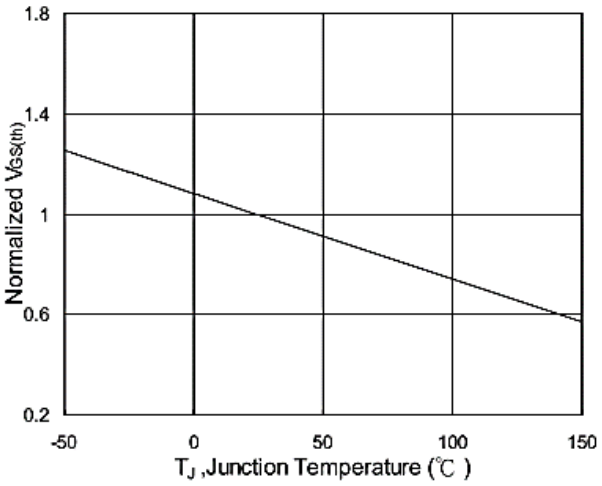


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

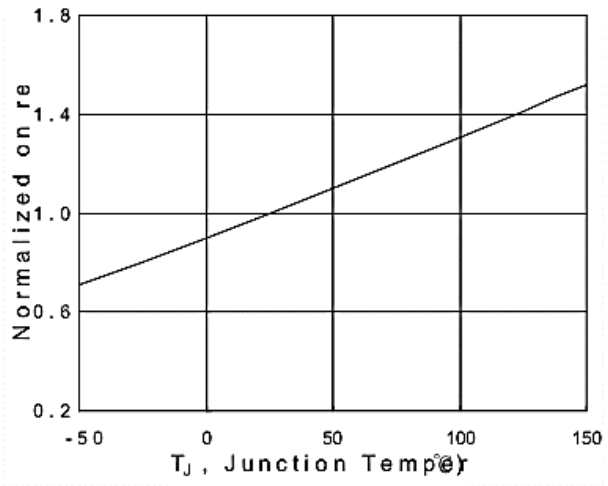


Fig.6 Normalized R_{DSON} v.s T_J

N-Channel Typical Characteristics (Cont.)

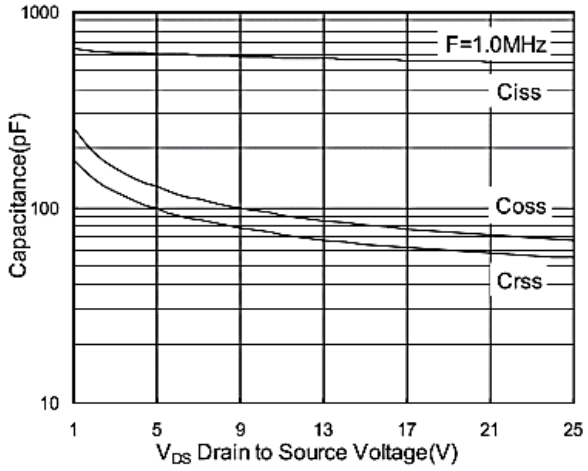


Fig.7 Capacitance

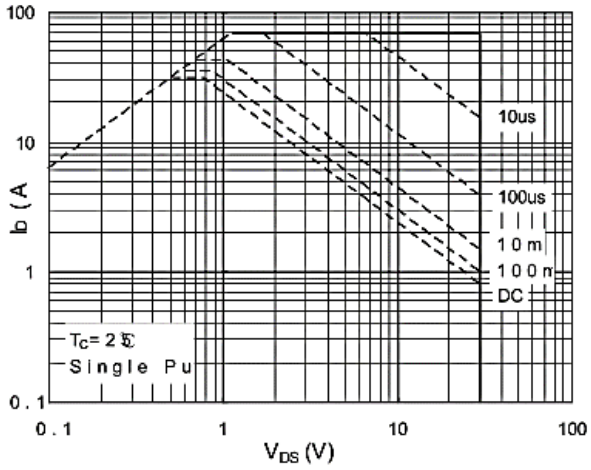


Fig.8 Safe Operating Area

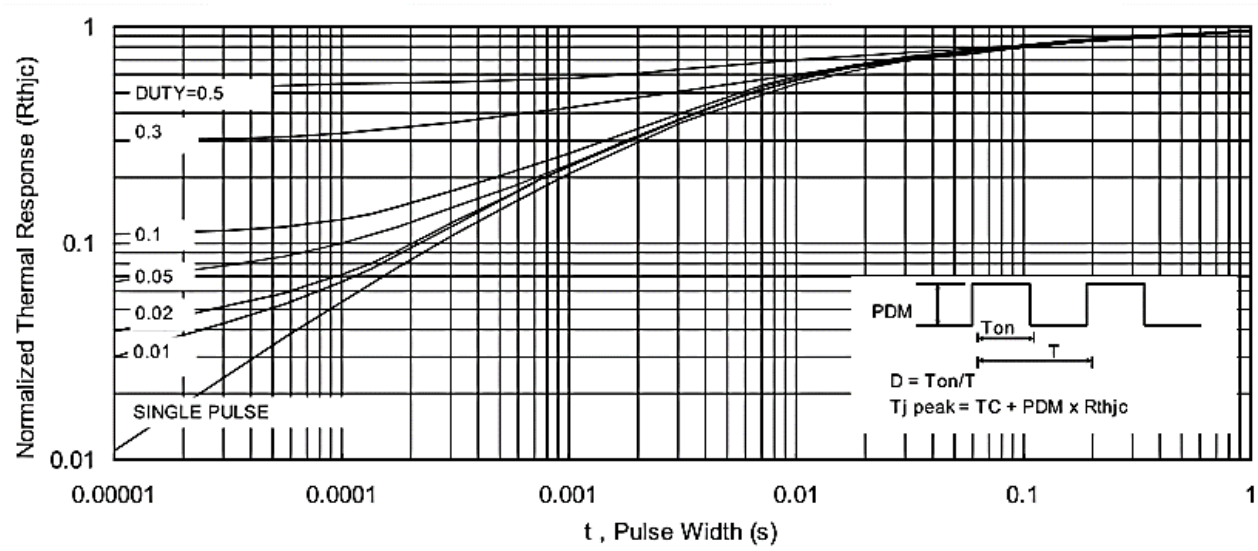


Fig.9 Normalized Maximum Transient Thermal Impedance

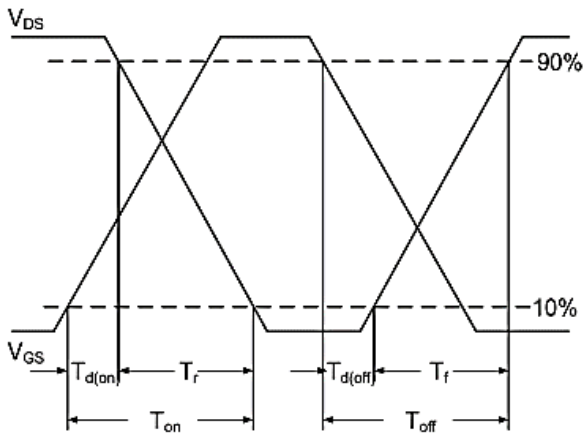


Fig.10 Switching Time Waveform

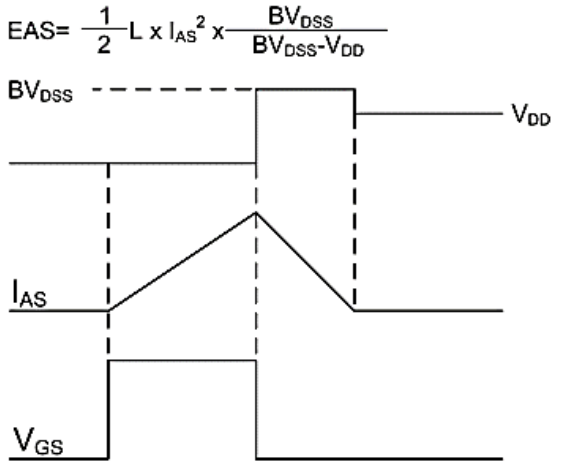


Fig.11 Unclamped Inductive Waveform

P-Channel Typical Characteristics

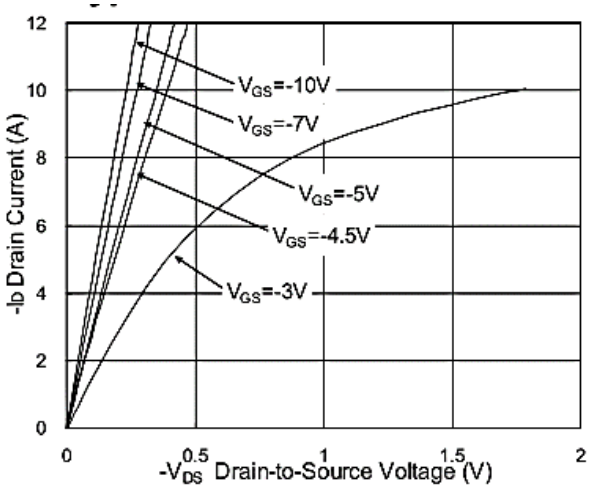


Fig.1 Typical Output Characteristics

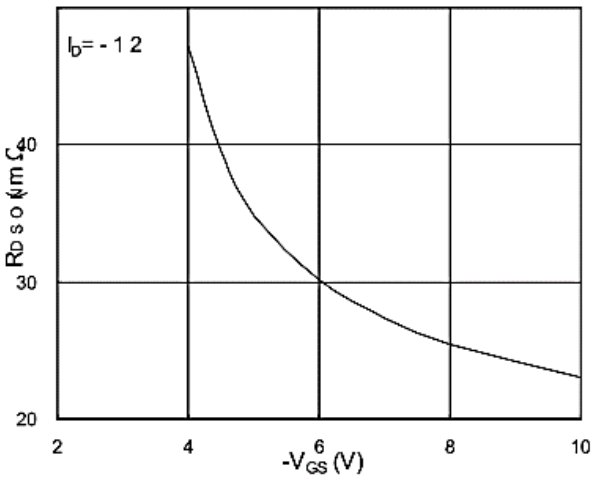


Fig.2 On-Resistance v.s Gate-Source

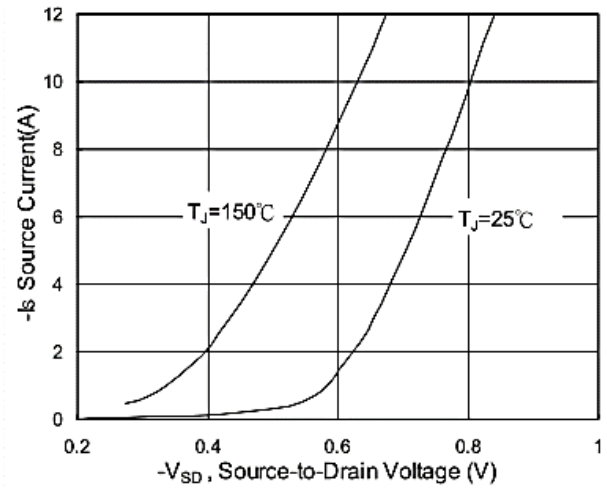


Fig.3 Forward Characteristics Of Reverse

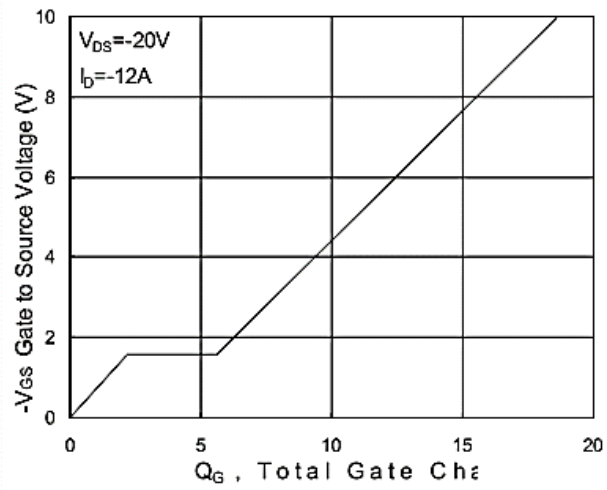


Fig.4 Gate-Charge Characteristics

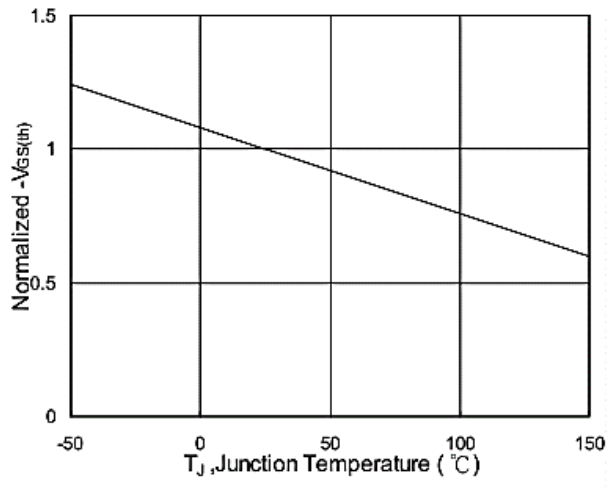


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

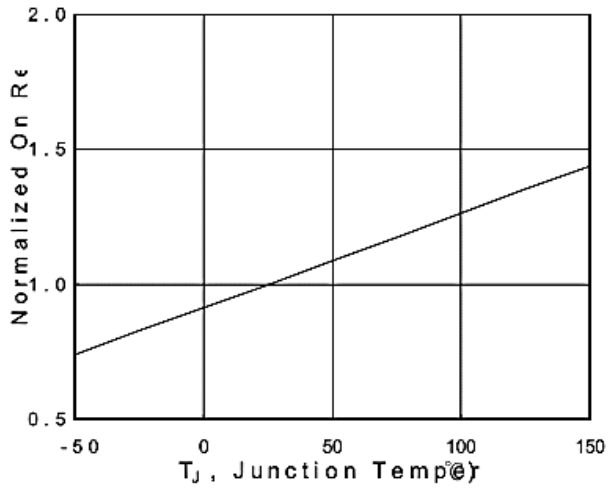


Fig.6 Normalized R_{DSON} v.s T_J

P-Channel Typical Characteristics (Cont.)

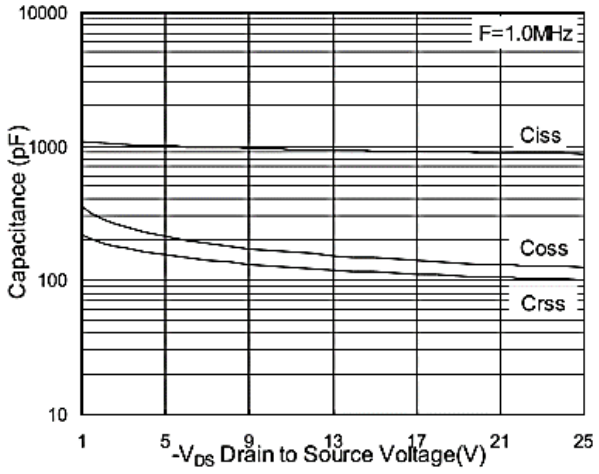


Fig.7 Capacitance

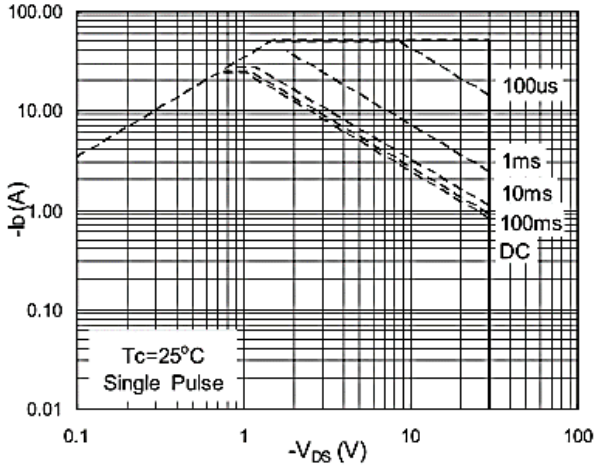


Fig.8 Safe Operating Area

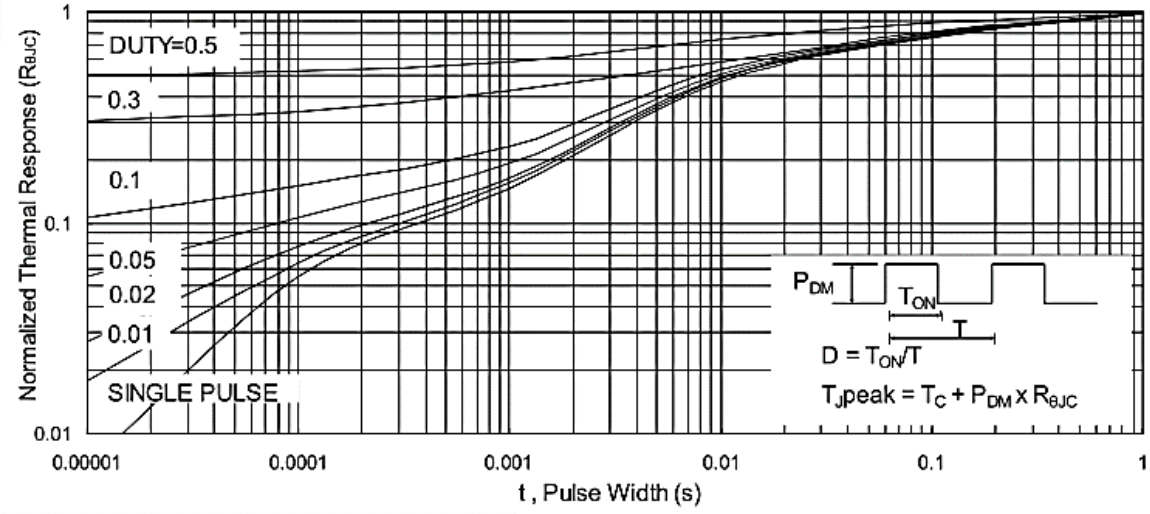


Fig.9 Normalized Maximum Transient Thermal Impedance

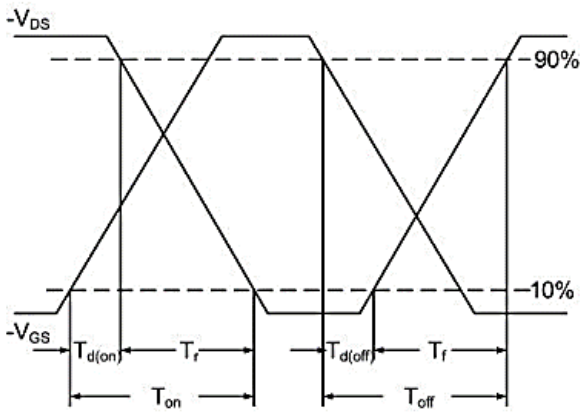


Fig.10 Switching Time Waveform

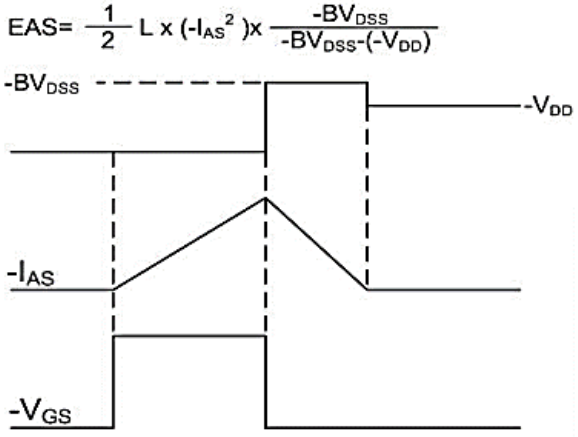
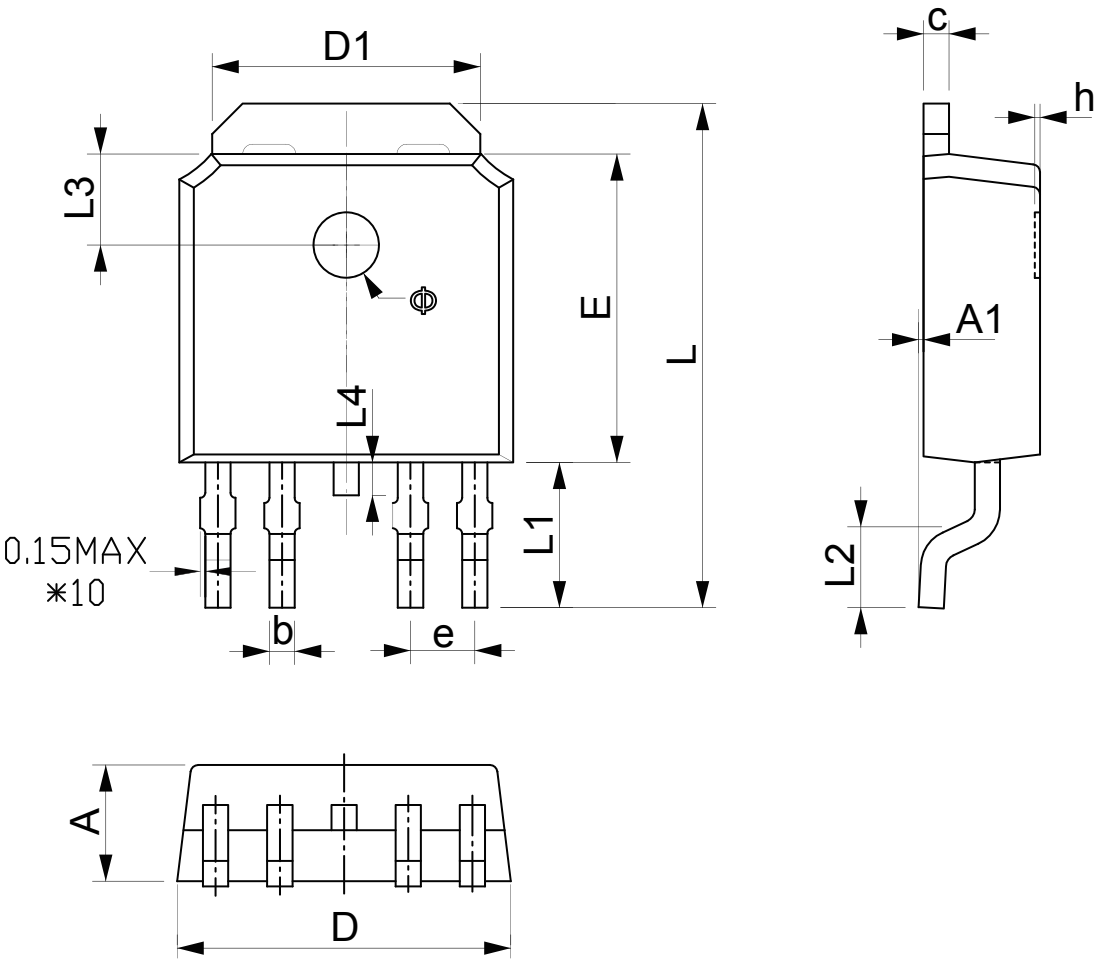


Fig.11 Unclamped Inductive Waveform

Packaging information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.400	0.600		
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.712	10.312	0.382	0.406
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
h	0.000	0.300	0.000	0.012

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