WSF3013C

N-Ch and P-Channel MOSFET

General Description

The WSF3013C 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 WSF3013C 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

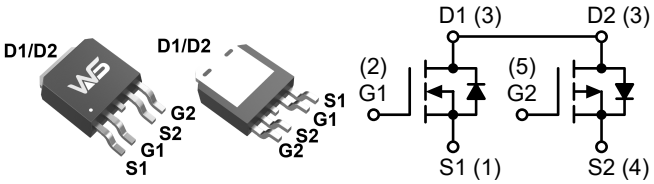
Product Summery

BVDSS	RDSON	ID
30V	15mΩ	25A
-30V	36mΩ	-18A

Applications

- BLDC
- DC-DC Power System

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℃	25	-18	A
	Continuous Drain Current, $V_{GS(NP)}$=10V,T_c=100℃	10	-10	A
I_{DP} [a]	Pulse Drain Current Tested, $V_{GS(NP)}$=10V	60	-50	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℃	25	25	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	60	60	℃/W
$R_{\theta JC}$	Thermal Resistance-Junction to Case,Steady State	5.1	5.1	℃/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	25	mΩ
		V_{GS}=4.5V , I_D=5A	---	24	40	
$V_{GS(th)}$	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	---	2.3	5.0	Ω
Q_g[e]	Total Gate Charge	V_{DS}=20V,	---	7.2	---	nC
Q_{gs}[e]	Gate-Source Charge	V_{GS}=4.5V,	---	1.4	---	
Q_{gd}[e]	Gate-Drain Charge	I_{DS}=1A	---	2.2	---	
$T_{d(on)}$[e]	Turn-On Delay Time	V_{DD}=12V,	---	4.1	---	ns
T_r[e]	Rise Time	I_{DS}=5A,	---	9.8	---	
$T_{d(off)}$[e]	Turn-Off Delay Time	V_{GS}=10V,	---	15.5	---	
T_f[e]	Fall Time	R_G=3.3R.	---	6.0	---	
C_{iss}[e]	Input Capacitance	V_{DS}=15V ,	---	611	---	pF
C_{oss}[e]	Output Capacitance	V_{GS}=0V ,	---	85	---	
C_{rss}[e]	Reverse Transfer Capacitance	f=1MHz	---	67	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	25	A
V_{SD}[d]	Diode Forward Voltage	V_{GS}=0V , I_S=1A	---	---	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=-4.0A	---	36	42	mΩ
		V_{GS}=-4.5V , I_D=-3.0A	---	52	60	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1.2	-1.7	-2.5	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-24V , V_{GS}=0V , T_J=25℃	---	---	-1	uA
		V_{DS}=-24V , 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}=-20V , V_{GS}=-4.5V , I_D=-4A	---	9.2	---	nC
Q_{gs}[e]	Gate-Source Charge		---	2.0	---	
Q_{gd}[e]	Gate-Drain Charge		---	3.1	---	
$T_{d(on)}$[e]	Turn-On Delay Time	V_{DD}=-24V , I_D=-1A ,R_L=15Ω, V_{GS}=-10V , R_G=3.3Ω.	---	15	---	ns
T_r[e]	Rise Time		---	19	---	
$T_{d(off)}$[e]	Turn-Off Delay Time		---	53	---	
T_f[e]	Fall Time		---	9	---	
C_{iss}[e]	Input Capacitance	V_{DS}=-15V , V_{GS}=0V , f=1MHz	---	910	---	pF
C_{oss}[e]	Output Capacitance		---	141	---	
C_{rss}[e]	Reverse Transfer Capacitance		---	98	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	-18	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

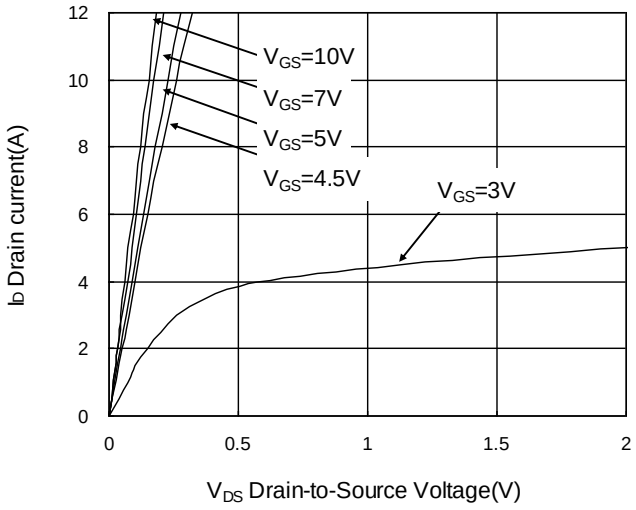


Fig.1 Typical Output Characteristics

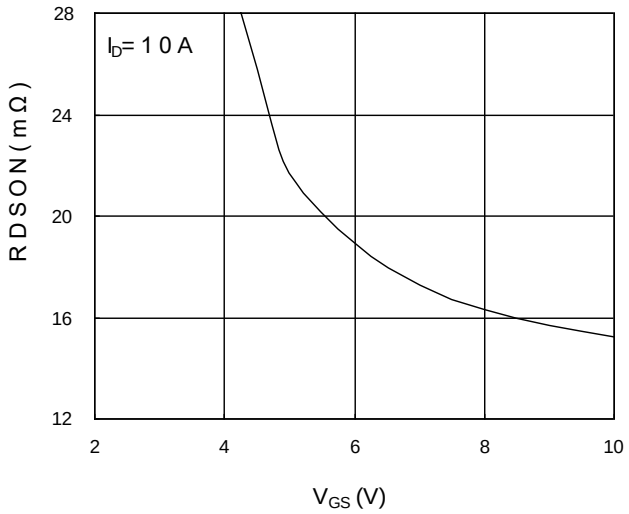


Fig.2 On-Resistance v.s Gate-Source

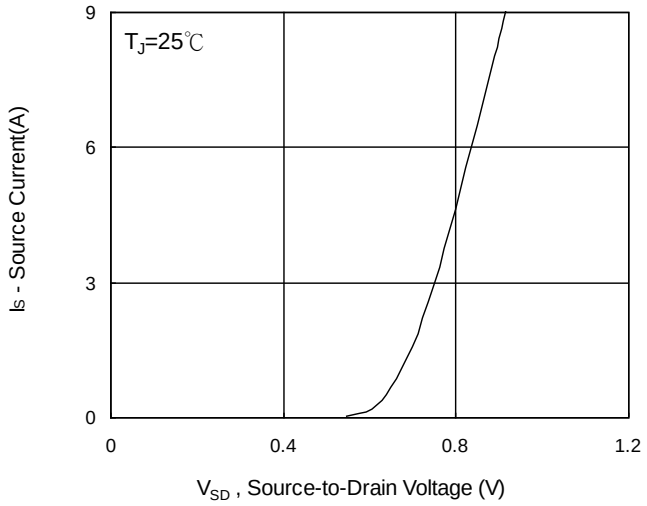


Fig.3 Forward Characteristics Of Reverse

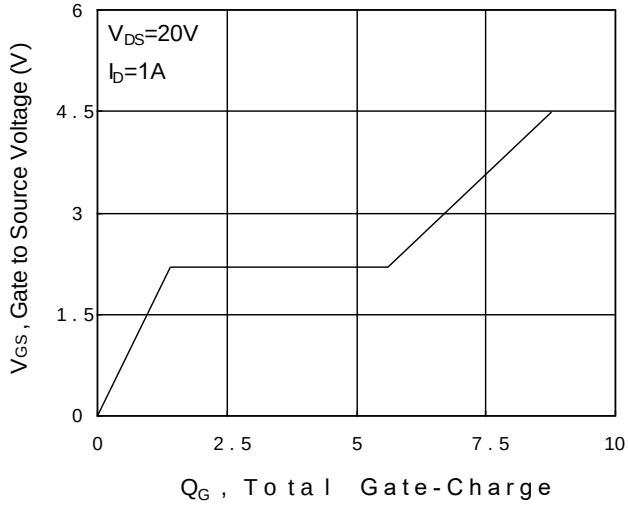


Fig.4 Gate-Charge characteristics

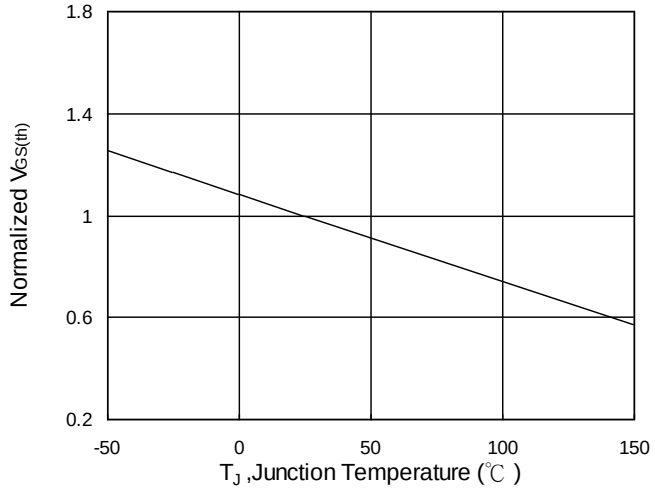


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

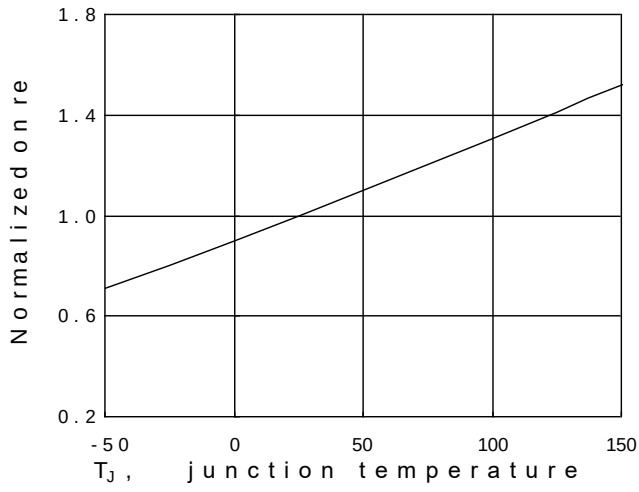


Fig.6 Normalized R_{DSON} v.s T_J

N-Channel Typical Characteristics

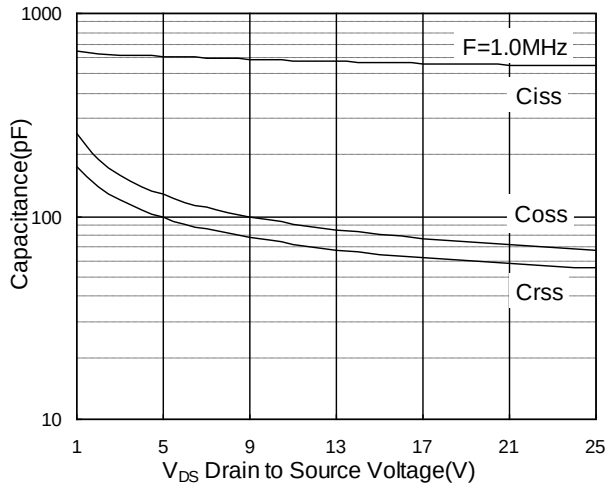


Fig.7 Capacitance

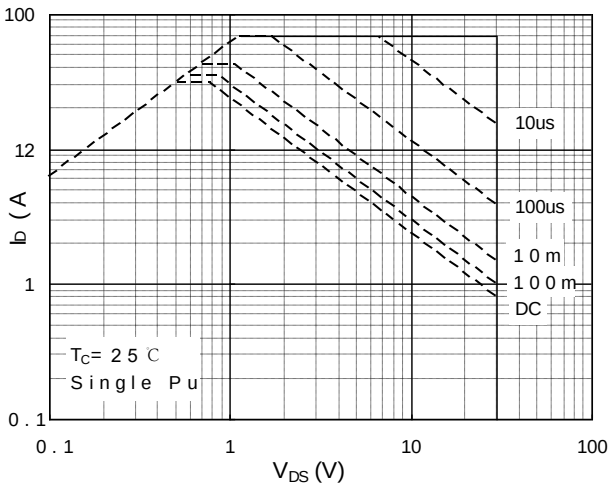


Fig.8 Safe Operating Area

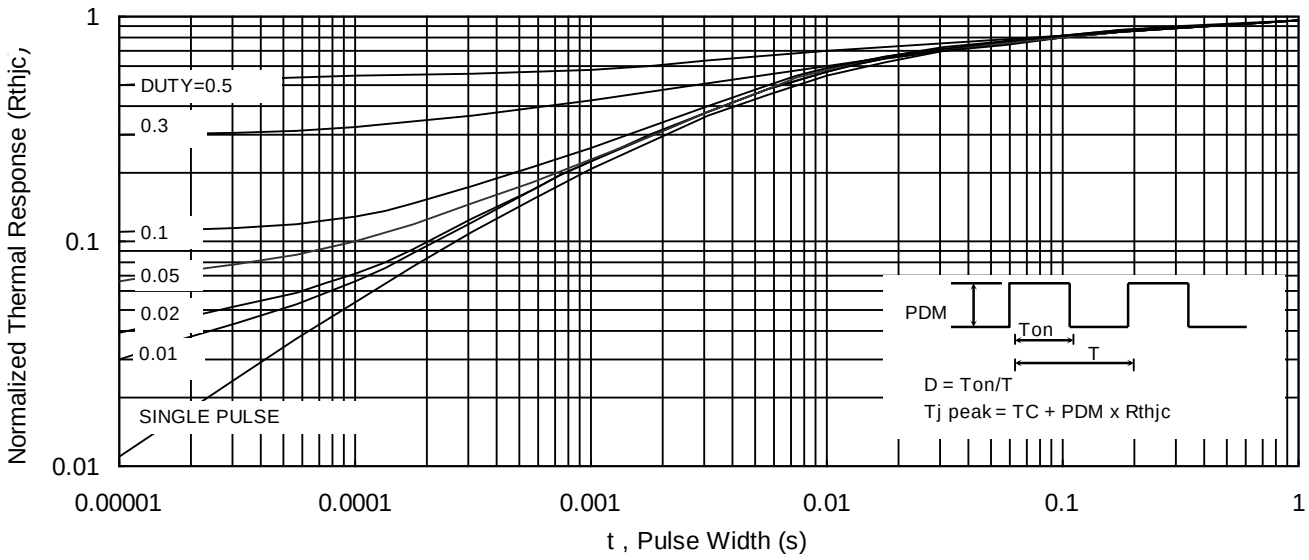


Fig.9 Normalized Maximum Transient Thermal Impedance

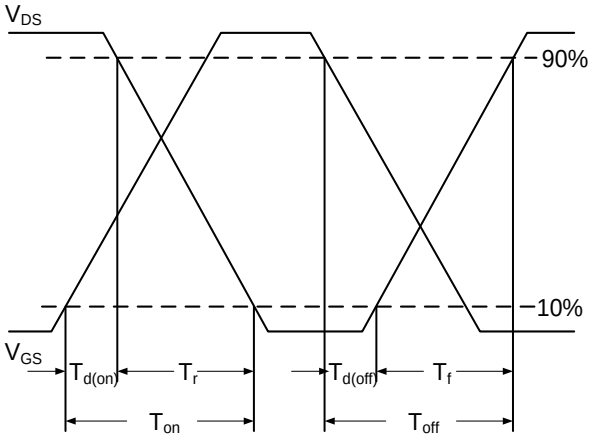


Fig.10 Switching Time Waveform

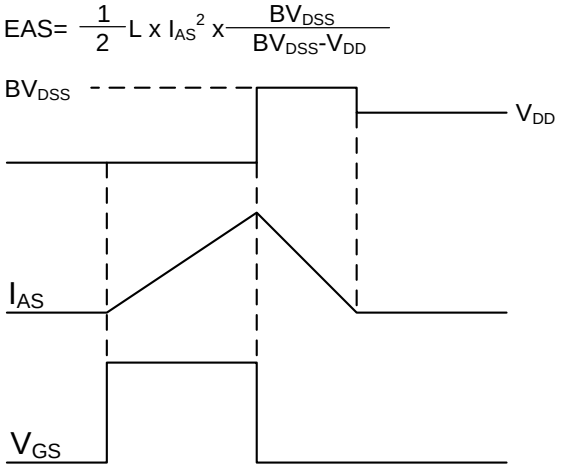


Fig.11 Unclamped Inductive Waveform

P-Channel Typical Characteristics

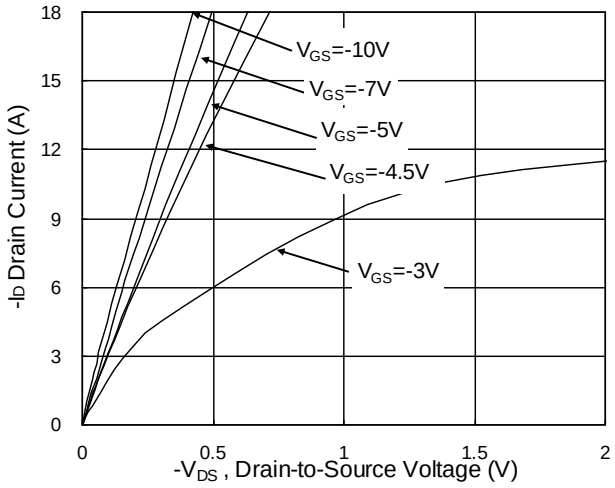


Fig.1 Typical Output Characteristics

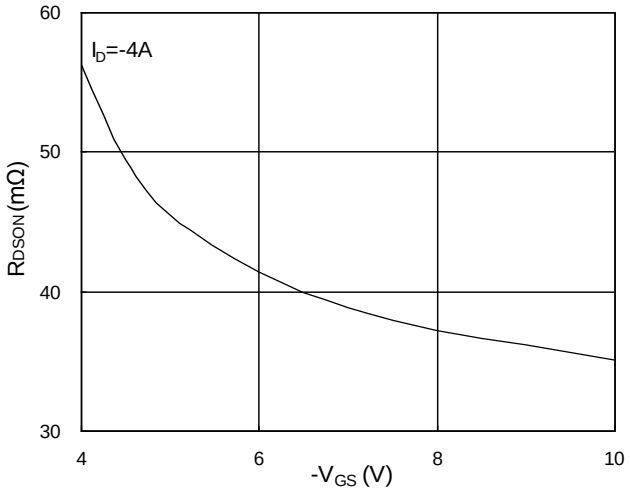


Fig.2 On-Resistance v.s Gate-Source

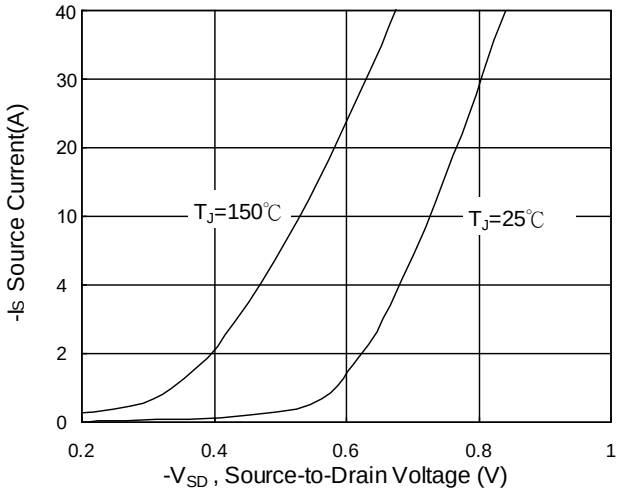


Fig.3 Forward Characteristics of Reverse

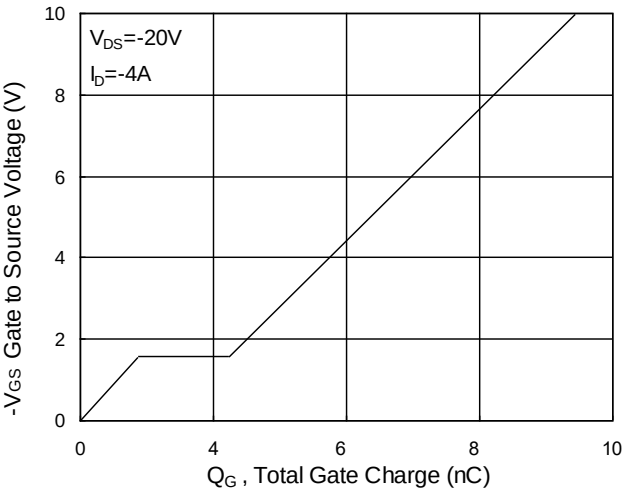


Fig.4 Gate-Charge Characteristics

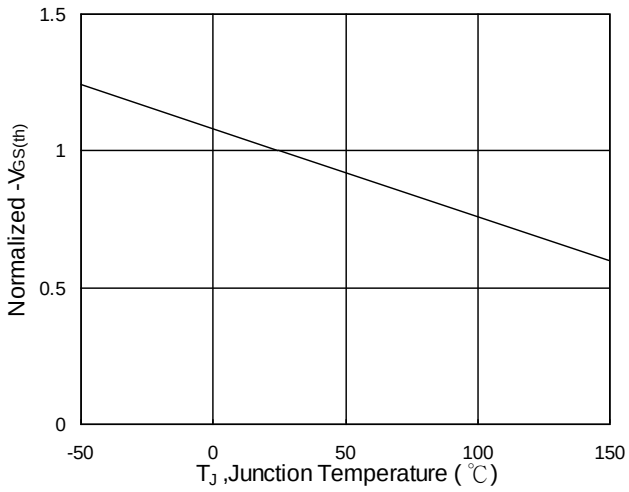


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

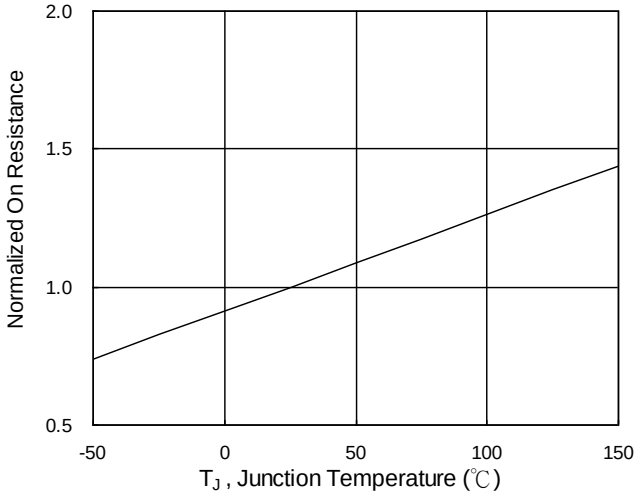


Fig.6 Normalized R_{DSON} v.s T_J

P-Channel Typical Characteristics

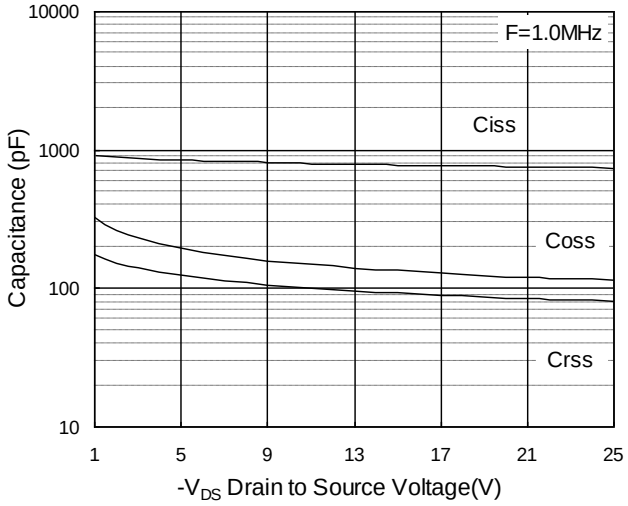


Fig.7 Capacitance

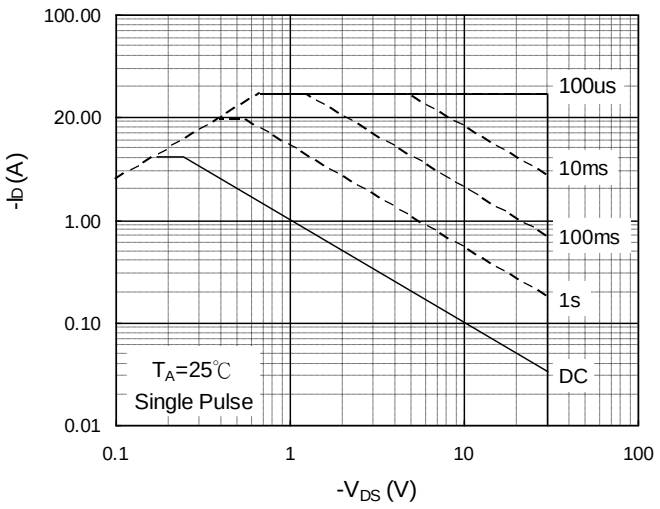


Fig.8 Safe Operating Area

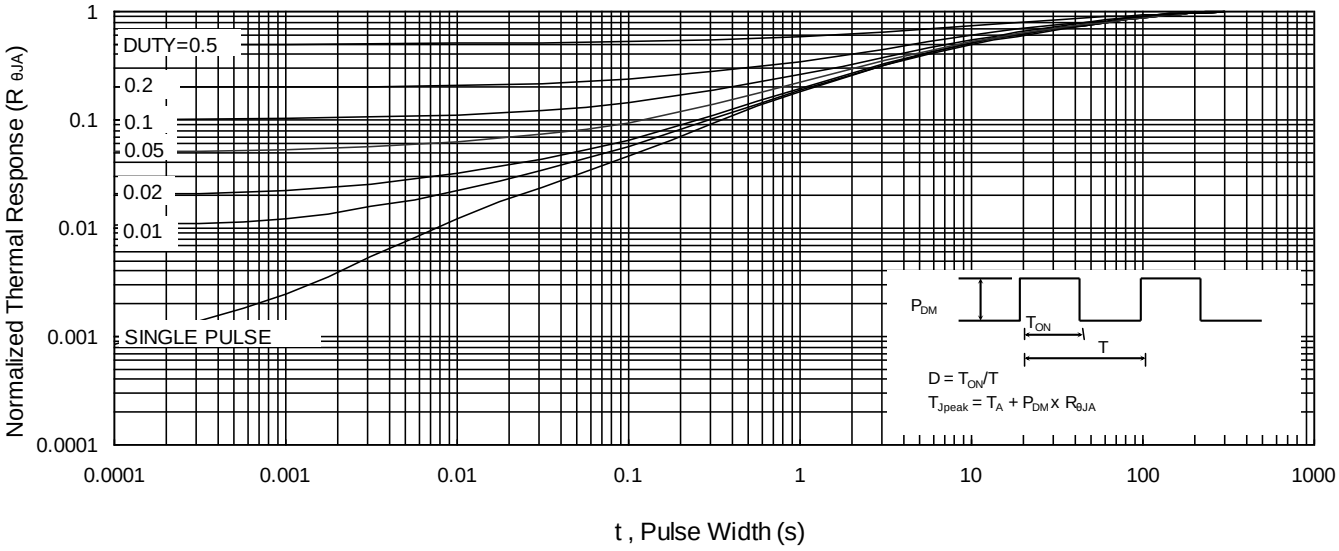


Fig.9 Normalized Maximum Transient Thermal Impedance

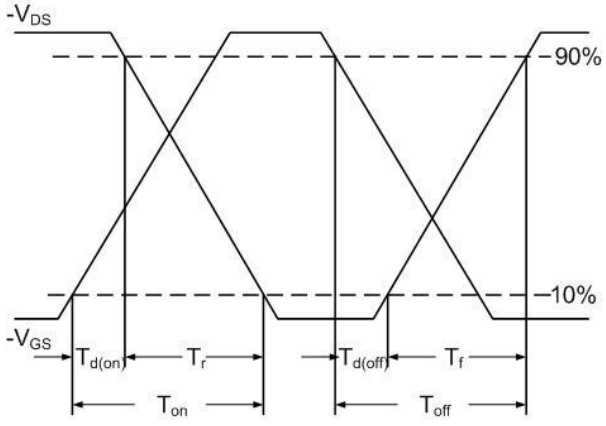


Fig.10 Switching Time Waveform

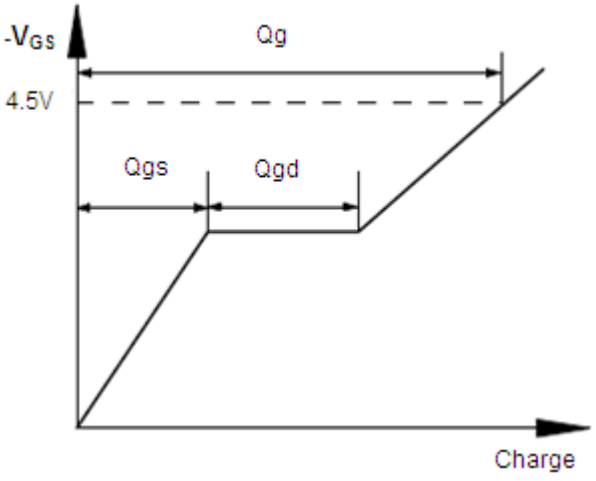
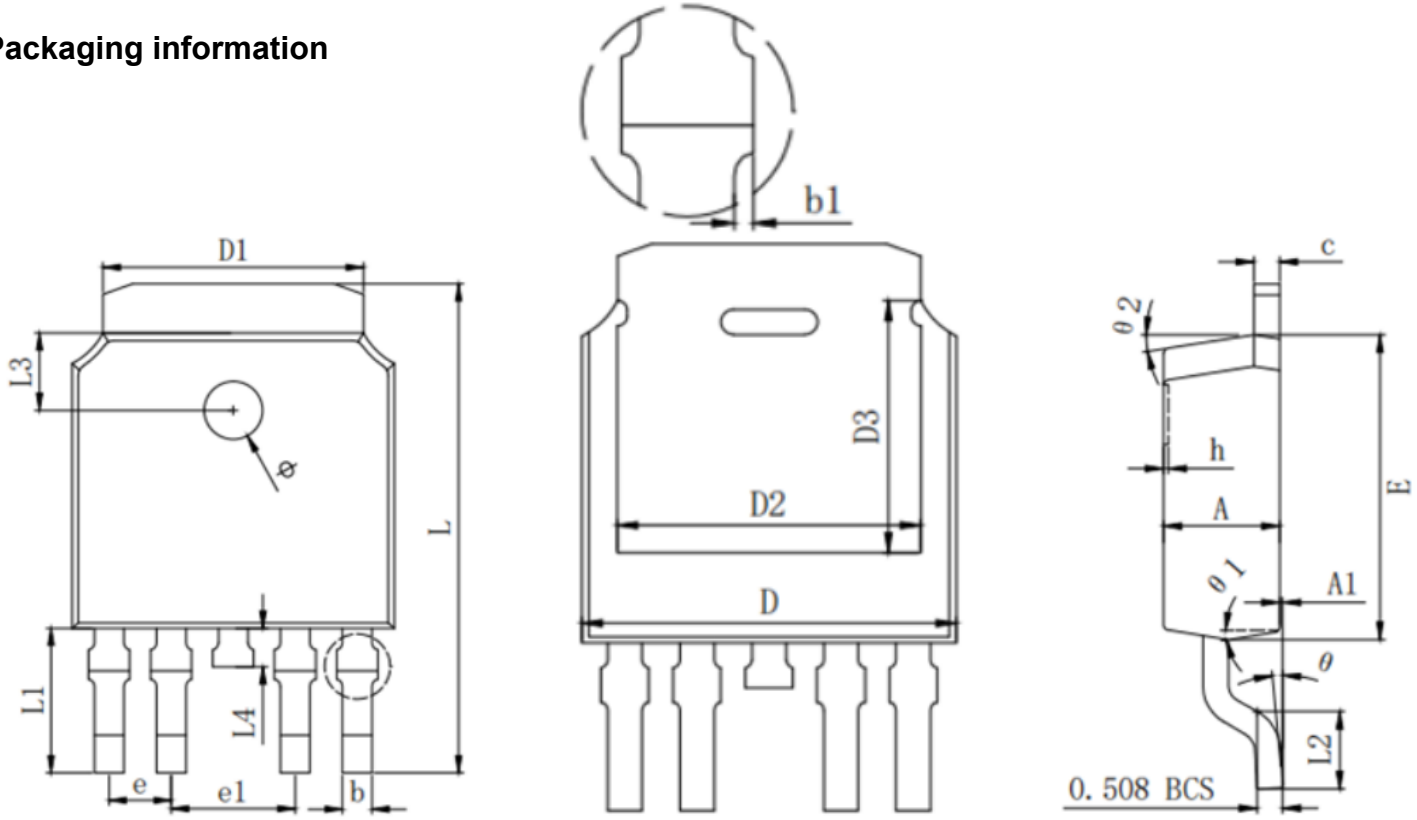


Fig.11 Gate Charge Waveform

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		

Attention

1, Any and all Winsok power products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your Winsok power representative nearest you before using any Winsok power products described or contained herein in such applications.

2,Winsok power assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all Winsok power products described or contained herein.

3, Specifications of any and all Winsok power products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.

4, Winsok power Semiconductor CO., LTD. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.

5,In the event that any or all Winsok power products(including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.

7, Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. Winsok power believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

8, Any and all information described or contained herein are subject to change without notice due to product/technology improvement,etc. When designing equipment, refer to the "Delivery Specification" for the Winsok power product that you Intend to use.

9, this catalog provides information as of Sep.2014. Specifications and information herein are subject to change without notice.