

General Description

The WSF3017 is the highest performance trench N-Ch and P-Channel MOSFETs with extreme high cell density, which provide excellent $R_{DS(ON)}$ and gate charge for most of the synchronous buck converter applications.

The WSF3017 meet the RoHS and Green Product requirement 100% E_{AS} guaranteed with full function reliability approved.

Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% E_{AS} Guaranteed
- Green Device Available

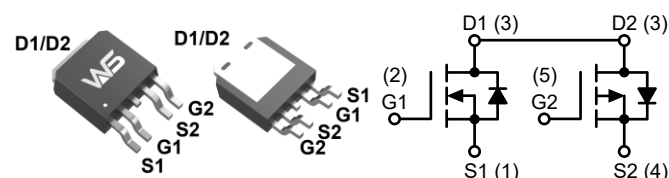
Product Summary

BV_{DSS}	$R_{DS(ON)}$	I_D
30V	16m Ω	24A
-30V	38m Ω	-18A

Applications

- BLDC
- DC-DC Power System

TO-252-4L Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-Channel	P-Channel	
V _{DS}	Drain-Source Voltage	30	-30	V
V _{GS}	Gate-Source Voltage	±20	±20	
I _D	Continuous Drain Current, V _{GS(NP)} =10V , T _C =25°C	24	-18	A
	Continuous Drain Current, V _{GS(NP)} =10V , T _C =100°C	10	-10	
I _{DP} ¹	Pulse Drain Current Tested, V _{GS(NP)} =10V	60	-50	
E _{AS} ³	Avalanche Energy, Single pulse, L=0.5mH	22	45	mJ
I _{AS} ³	Avalanche Current, Single pulse, L=0.5mH	21	-30	A
P _D	Total Power Dissipation, T _C =25°C	25	25	W
T _{STG}	Storage Temperature Range	-55 to 150		°C
T _J	Operating Junction Temperature Range	150		
R _{θJA} ²	Thermal Resistance-Junction to Ambient, Steady State	60		°C/W
R _{θJC}	Thermal Resistance-Junction to Case, Steady State	5.1		

N-Channel Electrical Characteristics ($T_J=25^{\circ}\text{C}$, Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=250\mu A$	30	---	---	V
$R_{DS(ON)}^4$	Static Drain-Source On-Resistance	$V_{GS}=10V$, $I_D=10A$	---	16	28	m Ω
		$V_{GS}=4.5V$, $I_D=5A$	---	25	42	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	1.0	1.6	2.5	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=20V$, $V_{GS}=0V$, $T_J=25^{\circ}\text{C}$	---	---	1.0	μA
		$V_{DS}=20V$, $V_{GS}=0V$, $T_J=85^{\circ}\text{C}$	---	---	30	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V$, $V_{DS}=0V$	---	---	± 100	nA
R_g	Gate Resistance	$V_{DS}=0V$, $V_{GS}=0V$, $f=1.0\text{MHz}$	---	2.3	5.0	Ω
Q_g^5	Total Gate Charge	$V_{DS}=20V$, $V_{GS}=4.5V$, $I_{DS}=1A$	---	7.2	---	nC
Q_{gs}^5	Gate-Source Charge		---	1.4	---	
Q_{gd}^5	Gate-Drain Charge		---	2.2	---	
$T_{d(on)}^5$	Turn-On Delay Time	$V_{DD}=12V$, $I_{DS}=5A$, $V_{GS}=10V$, $R_G=3.3\Omega$	---	4.1	---	ns
T_r^5	Rise Time		---	9.8	---	
$T_{d(off)}^5$	Turn-Off Delay Time		---	15.5	---	
T_f^5	Fall Time		---	6.0	---	
C_{iss}^5	Input Capacitance	$V_{DS}=15V$, $V_{GS}=0V$, $f=1.0\text{MHz}$	---	611	---	pF
C_{oss}^5	Output Capacitance		---	85	---	
C_{rss}^5	Reverse Transfer Capacitance		---	67	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I_S	Continuous Source Current	$V_G=V_D=0V$, Force Current	---	---	25	A
V_{SD}^4	Diode Forward Voltage	$V_{GS}=0V$, $I_S=1A$	---	---	1.2	V

Note:

*. Max. current is limited by bonding wire.

1. Pulse width limited by max. junction temperature.

2. $R_{\theta JA}$ steady state $t=999s$. $R_{\theta JA}$ is measured with the device mounted on 1in², FR-4 board with 2oz. Copper.

3. UIS tested and pulse width limited by maximum junction temperature 150 $^{\circ}\text{C}$ (initial temperature $T_J=25^{\circ}\text{C}$).

4. Pulse test ; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

5. Guaranteed by design, not subject to production testing.

P-Channel Electrical Characteristics ($T_J=25^{\circ}\text{C}$, Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=-250\mu A$	-30	---	---	V
$R_{DS(ON)}^4$	Static Drain-Source On-Resistance	$V_{GS}=-10V$, $I_D=-4A$	---	38	44	m Ω
		$V_{GS}=-4.5V$, $I_D=-3A$	---	54	62	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	-1.2	-1.7	-2.5	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=-24V$, $V_{GS}=0V$, $T_J=25^{\circ}\text{C}$	---	---	-1.0	μA
		$V_{DS}=-24V$, $V_{GS}=0V$, $T_J=85^{\circ}\text{C}$	---	---	-30	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V$, $V_{DS}=0V$	---	---	± 100	nA
Q_g^5	Total Gate Charge	$V_{DS}=-20V$, $V_{GS}=-4.5V$, $I_D=-4A$	---	9.2	---	nC
Q_{gs}^5	Gate-Source Charge		---	2.0	---	
Q_{gd}^5	Gate-Drain Charge		---	3.1	---	
$T_{d(on)}^5$	Turn-On Delay Time	$V_{DD}=-24V$, $I_D=-1A$, $R_L=15\Omega$, $V_{GS}=-10V$, $R_G=3.3\Omega$	---	15	---	ns
T_r^5	Rise Time		---	19	---	
$T_{d(off)}^5$	Turn-Off Delay Time		---	53	---	
T_f^5	Fall Time		---	9	---	
C_{iss}^5	Input Capacitance	$V_{DS}=-15V$, $V_{GS}=0V$, $f=1.0\text{MHz}$	---	910	---	pF
C_{oss}^5	Output Capacitance		---	141	---	
C_{rss}^5	Reverse Transfer Capacitance		---	98	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I_S	Continuous Source Current	$V_G=V_D=0V$, Force Current	---	---	-18	A
V_{SD}^5	Diode Forward Voltage	$V_{GS}=0V$, $I_S=-1A$, $T_J=25^{\circ}\text{C}$	---	---	-1.2	V

Note:

*. Max. current is limited by bonding wire.

1. Pulse width limited by max. junction temperature.

2. $R_{\theta JA}$ steady state $t=999s$. $R_{\theta JA}$ is measured with the device mounted on 1in², FR-4 board with 2oz. Copper.

3. UIS tested and pulse width limited by maximum junction temperature 150 $^{\circ}\text{C}$ (initial temperature $T_J=25^{\circ}\text{C}$).

4. Pulse test ; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

5. Guaranteed by design, not subject to production testing.

N-Channel Typical Characteristics

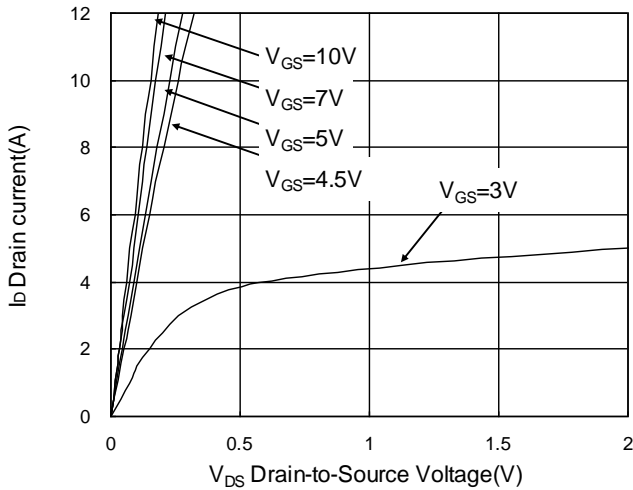


Fig.1 Typical Output Characteristics

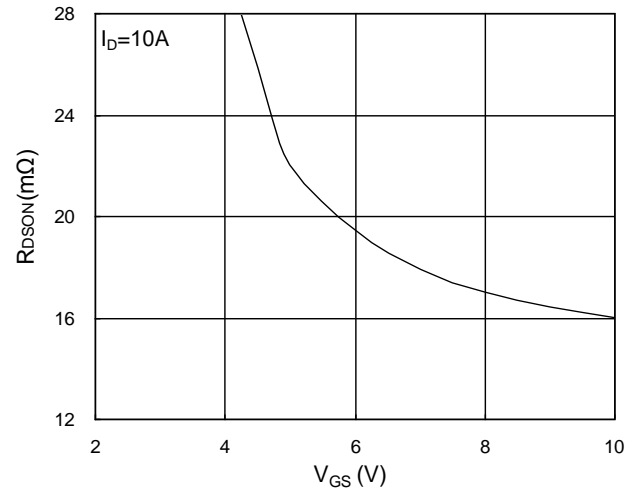


Fig.2 On-Resistance v.s Gate-Source

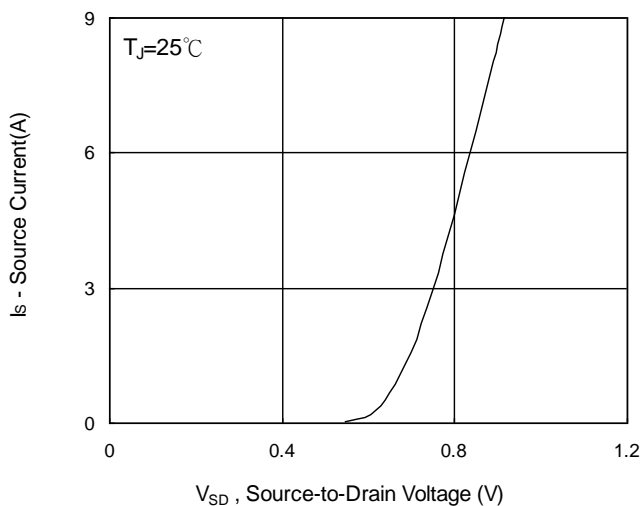


Fig.3 Forward Characteristics Of Reverse

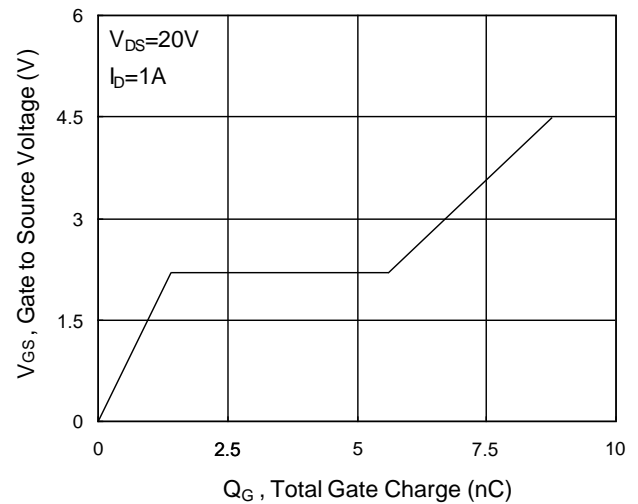


Fig.4 Gate-Charge characteristics

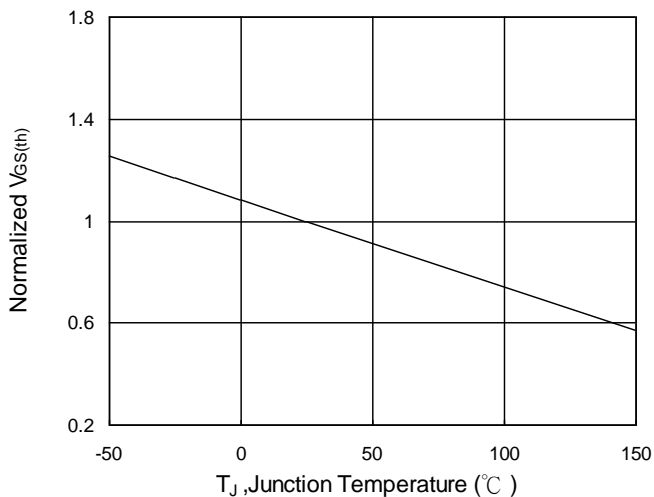


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

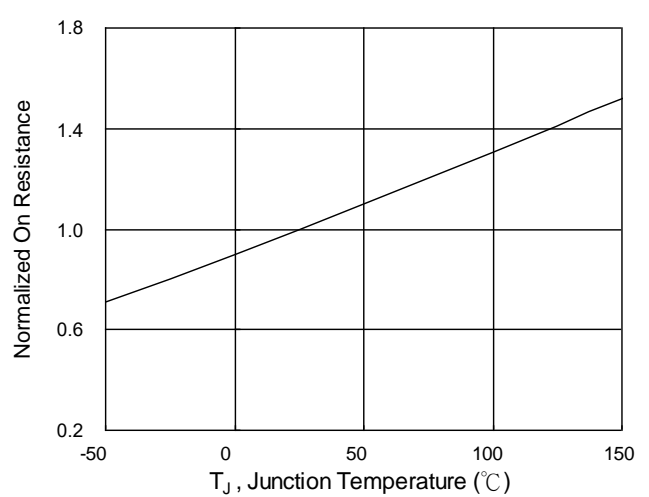
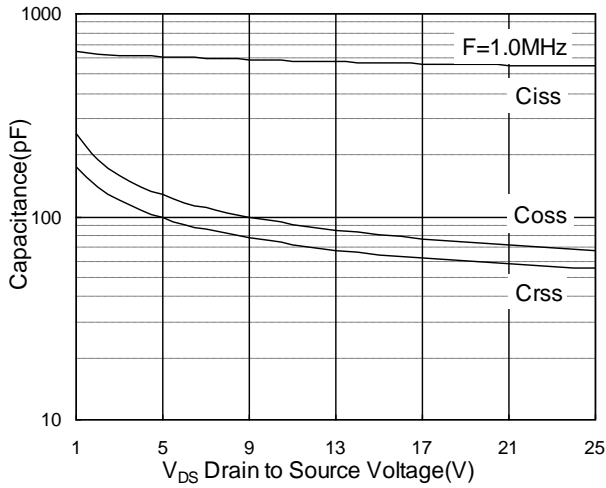
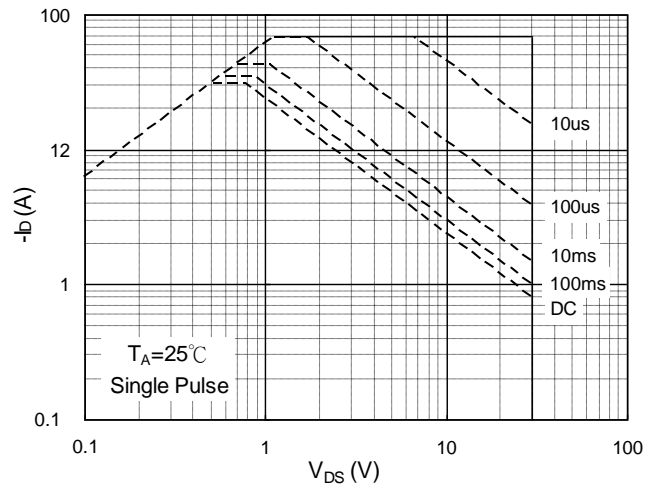
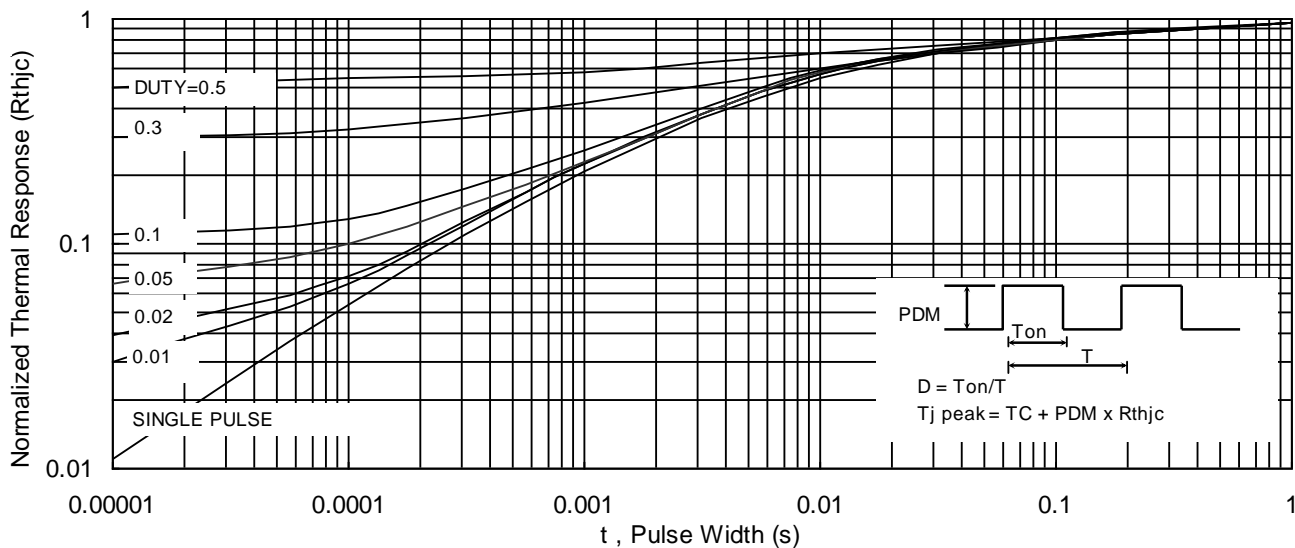
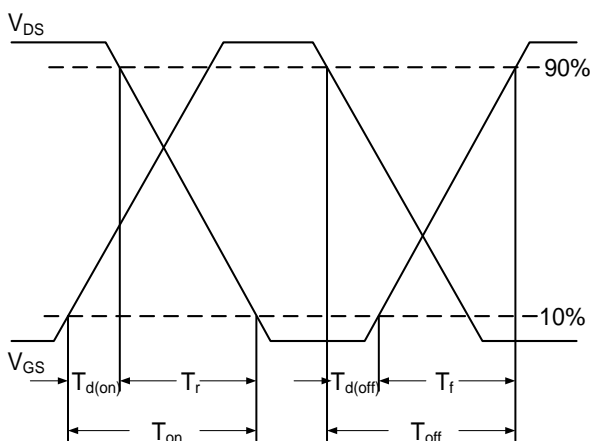
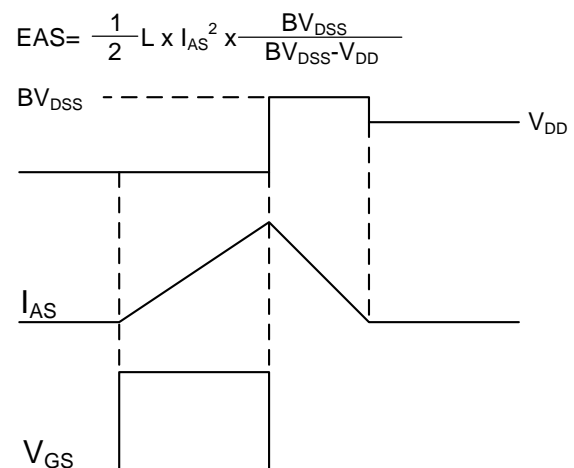


Fig.6 Normalized $R_{DS(on)}$ v.s T_J

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

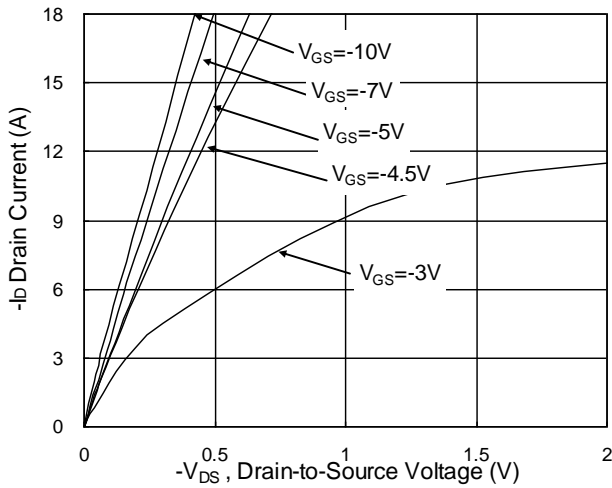


Fig.1 Typical Output Characteristics

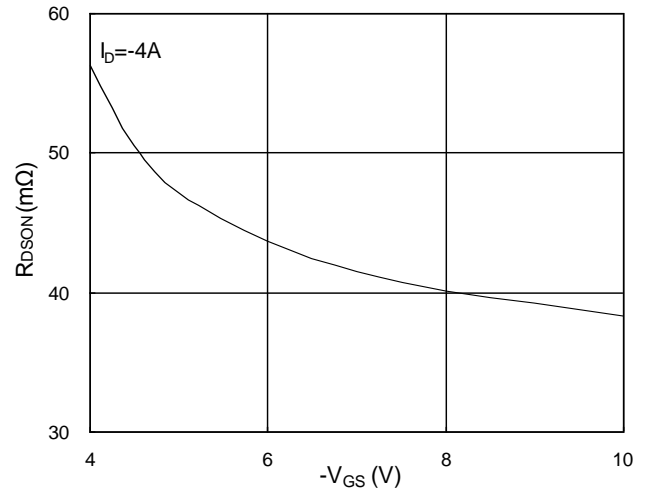


Fig.2 On-Resistance v.s Gate-Source

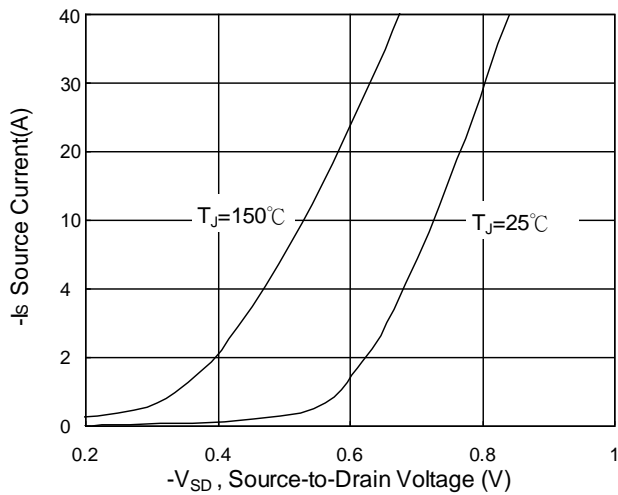


Fig.3 Forward Characteristics of Reverse

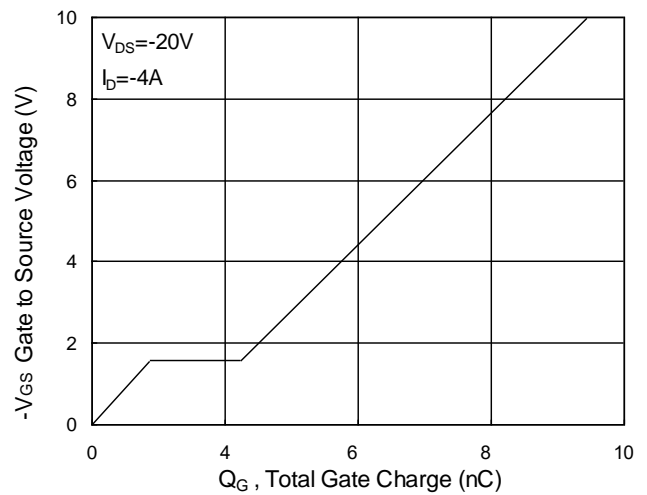


Fig.4 Gate-Charge Characteristics

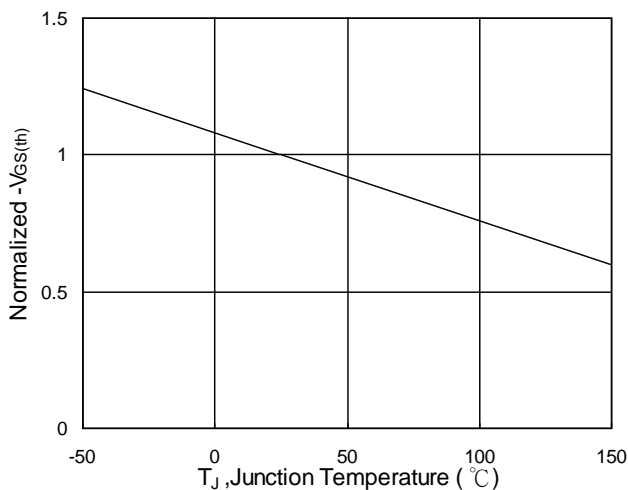


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

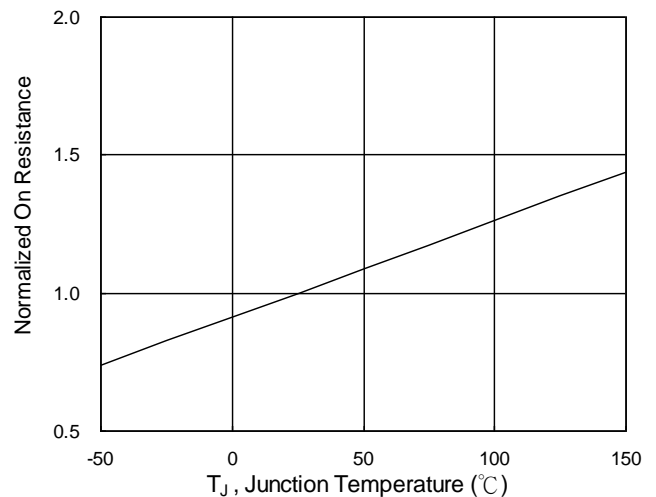


Fig.6 Normalized $R_{DS(on)}$ v.s T_J

P-Channel Typical Characteristics (Cont.)

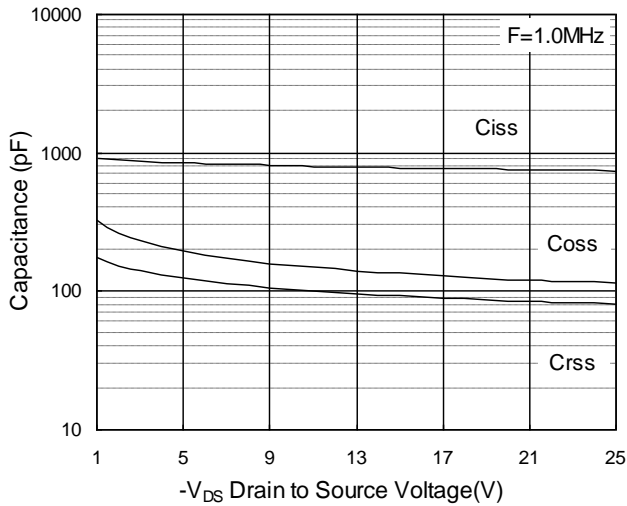


Fig.7 Capacitance

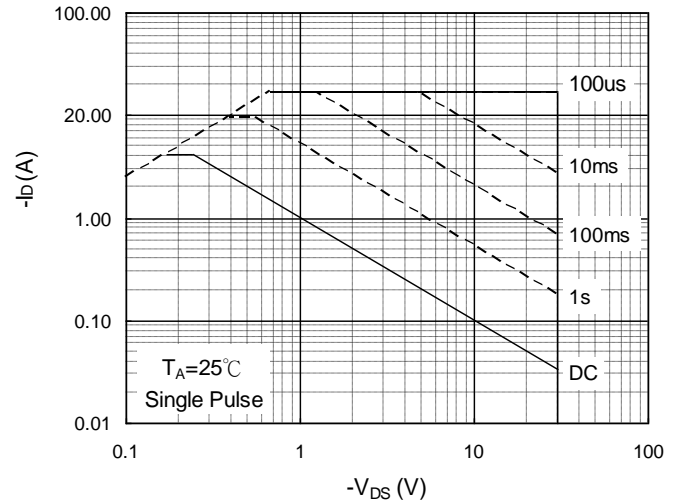


Fig.8 Safe Operating Area

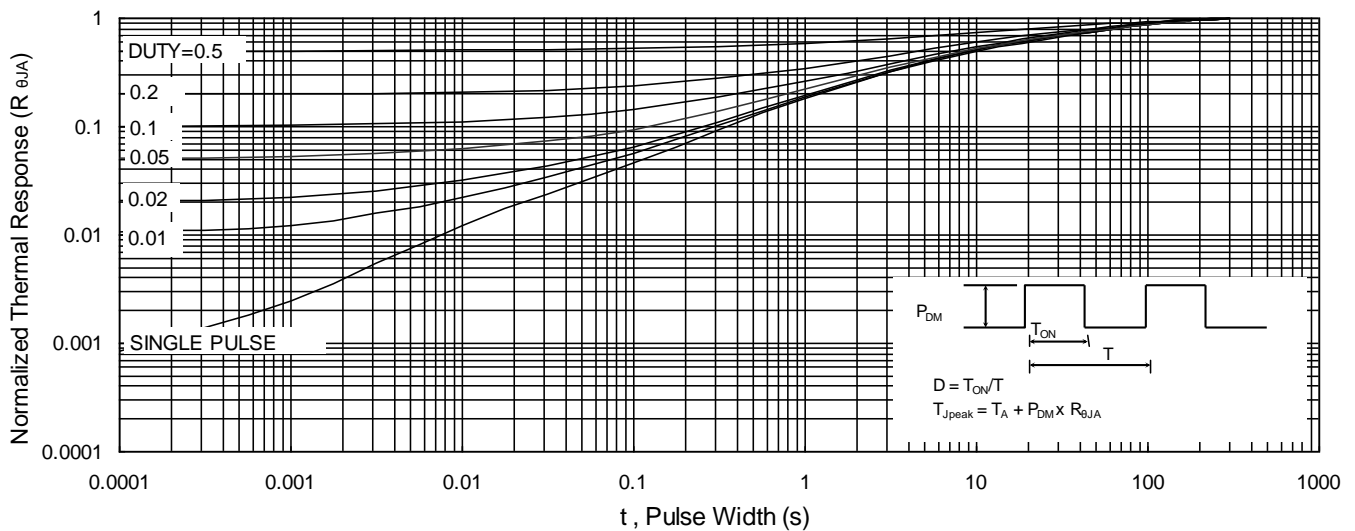


Fig.9 Normalized Maximum Transient Thermal Impedance

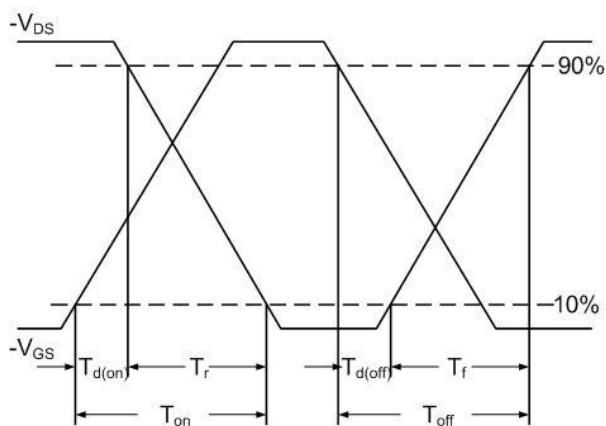


Fig.10 Switching Time Waveform

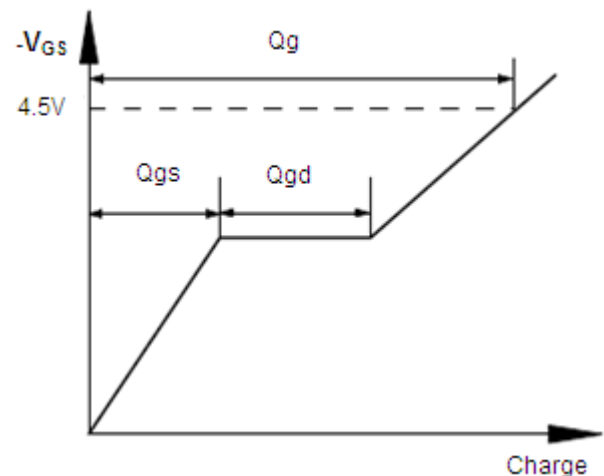
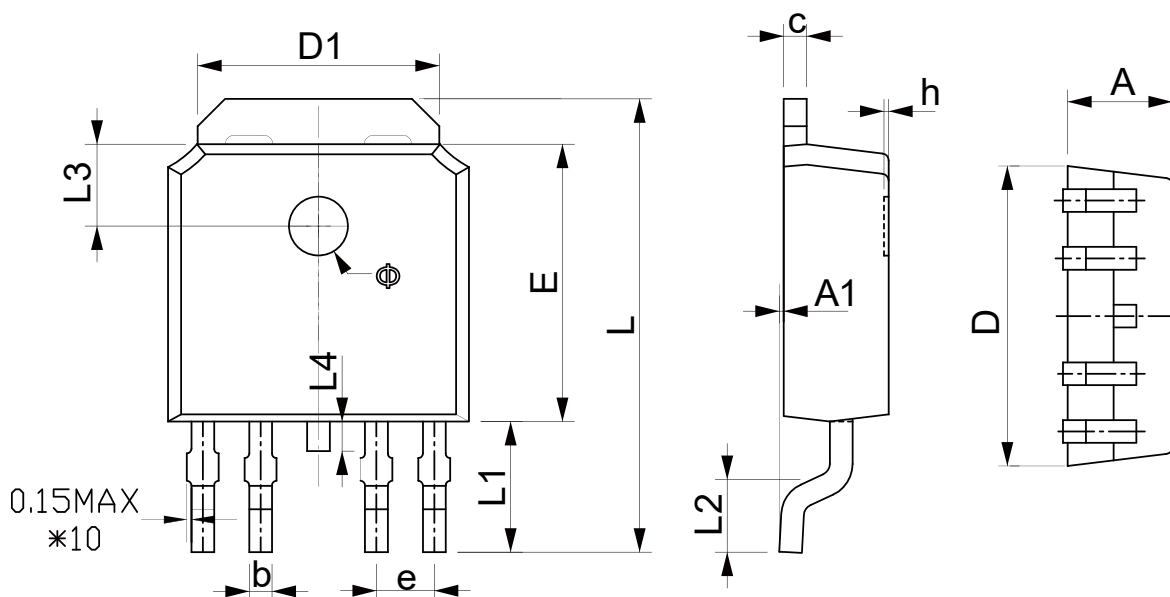


Fig.11 Gate Charge Waveform

Packaging information



SYMBOL	MILLIMETERS		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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