

General Description

The WSK42P10 is the highest performance trench P-Channel MOSFET with extreme high cell density, which provide excellent R_{DS(on)} and gate charge for most of the synchronous buck converter applications.

The WSK42P10 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

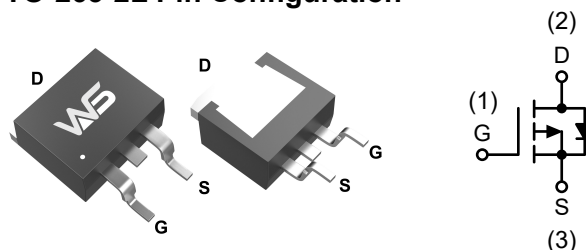
Product Summary

BV _{DSS}	R _{DS(on)}	I _D
-100V	78mΩ	-42A

Applications

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

TO-263-2L Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V _{DS}	Drain-Source Voltage	-100	V
V _{GS}	Gate-Source Voltage	±20	V
I _D @T _C =25°C	Continuous Drain Current, -V _{GS} @ -10V ¹	-42	A
I _D @T _C =100°C	Continuous Drain Current, -V _{GS} @ -10V ¹	-19	A
I _{DM}	Pulsed Drain Current ²	-75	A
EAS	Single Pulse Avalanche Energy ³	89	mJ
I _{AS}	Avalanche Current	-18.9	A
P _D @T _C =25°C	Total Power Dissipation ⁴	54	W
T _{STG}	Storage Temperature Range	-55 to 150	°C
T _J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
R _{θJA}	Thermal Resistance Junction-Ambient ¹	---	62	°C/W
R _{θJC}	Thermal Resistance Junction-Case ¹	---	2.3	°C/W

Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-100	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C , $I_D=-1\text{mA}$	---	-0.021	---	V/ $^{\circ}\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=-10V, I_D=-10A$	---	78	95	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.2	-1.7	-2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	4.08	---	mV/ $^{\circ}\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=-48V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	---	---	1	μA
		$V_{DS}=-48V, V_{GS}=0V, T_J=55^{\circ}\text{C}$	---	---	5	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
g_{fs}	Forward Transconductance	$V_{DS}=-10V, I_D=-10A$	---	24	---	S
Q_g	Total Gate Charge (-4.5V)	$V_{DS}=-50V, V_{GS}=-10V, I_D=-20A$	---	44	---	nC
Q_{gs}	Gate-Source Charge		---	9	---	
Q_{gd}	Gate-Drain Charge		---	6	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=-30V, V_{GS}=-10V, R_G=6\Omega, I_D=-10A, R_G=30\Omega.$	---	12	---	ns
T_r	Rise Time		---	27	---	
$T_{d(off)}$	Turn-Off Delay Time		---	79	---	
T_f	Fall Time		---	53	---	
C_{iss}	Input Capacitance	$V_{DS}=-30V, V_{GS}=0V, f=1\text{MHz}$	---	3029	---	pF
C_{oss}	Output Capacitance		---	129	---	
C_{rss}	Reverse Transfer Capacitance		---	76	---	

Guaranteed Avalanche Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy ⁵	$V_{DD}=-25V, L=0.5\text{mH}, I_{AS}=-10A$	100	---	---	mJ

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current ^{1,6}	$V_G=V_D=0V$, Force Current	---	---	-18	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V, I_S=-1A, T_J=25^{\circ}\text{C}$	---	---	-1.2	V

Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper, $t \leq 10\text{sec}$.
- 2.The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is $V_{DD}=-25V, V_{GS}=-10V, L=0.5\text{mH}, I_{AS}=-18.9A$
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The Min. value is 100% EAS tested guarantee.
- 6.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Typical Characteristics

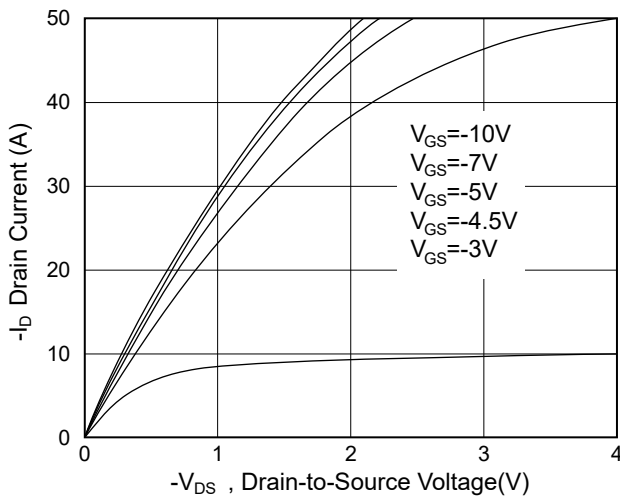


Fig.1 Typical Output Characteristics

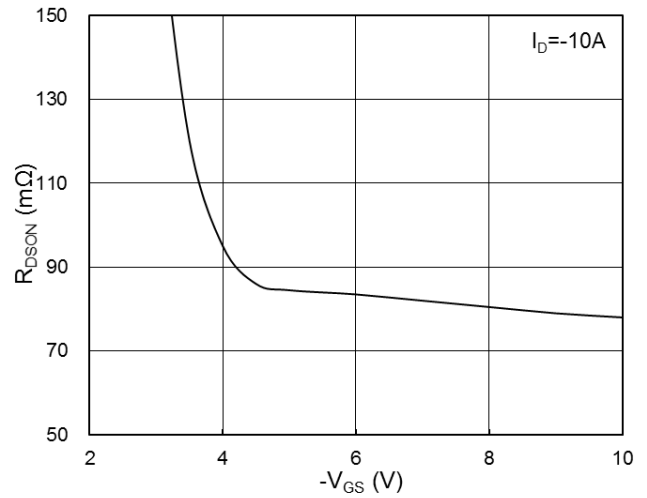


Fig.2 On-Resistance vs G-S Voltage

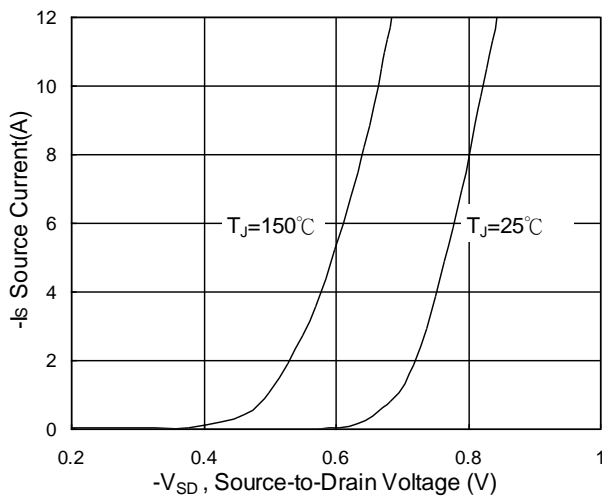


Fig.3 Typical S-D Diode Forward Voltage

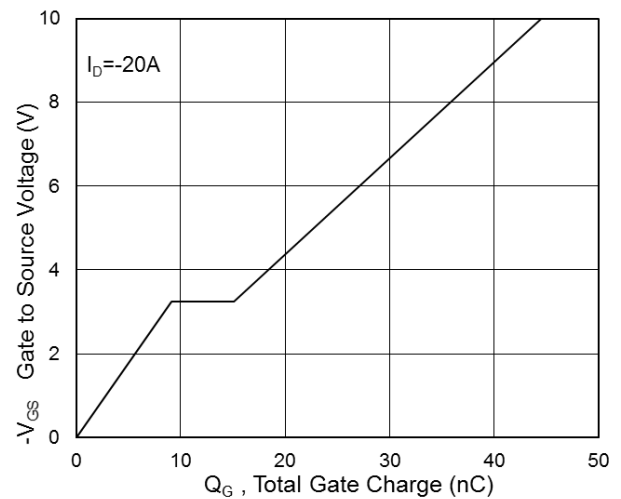


Fig.4 Gate-Charge Characteristics

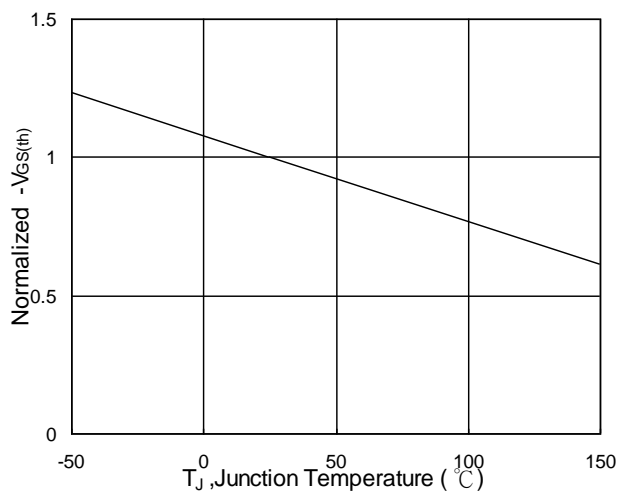


Fig.5 Normalized $V_{GS(th)}$ vs T_J

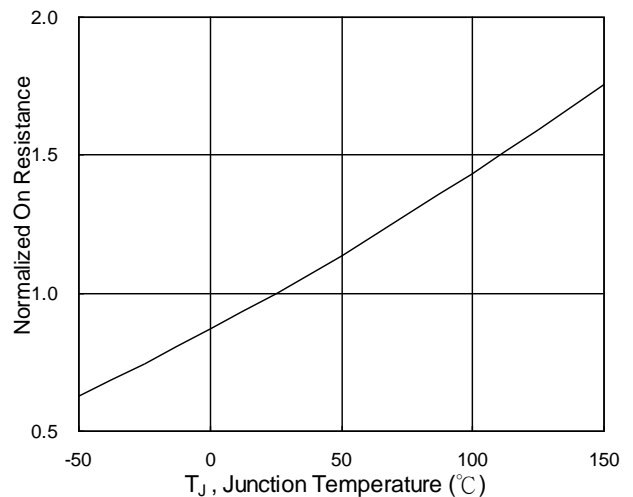


Fig.6 Normalized $R_{DS(on)}$ vs T_J

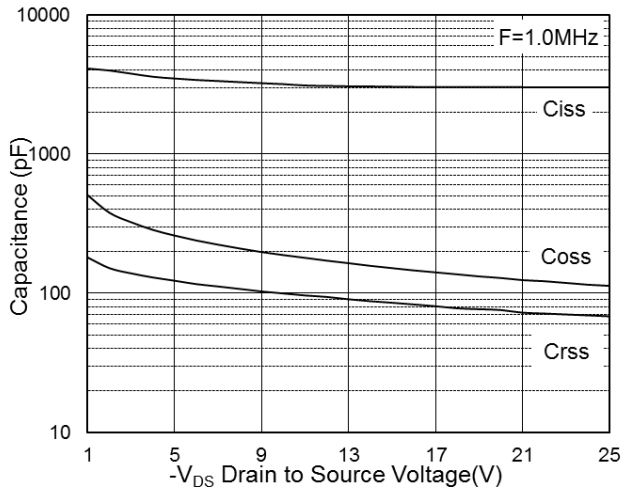


Fig.7 Capacitance

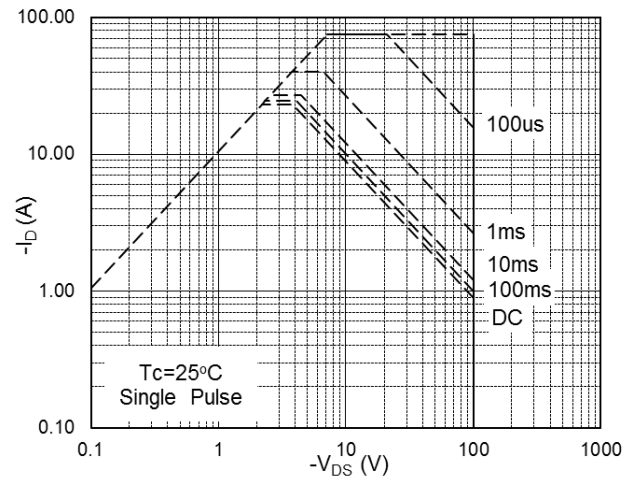


Fig.8 Safe Operating Area

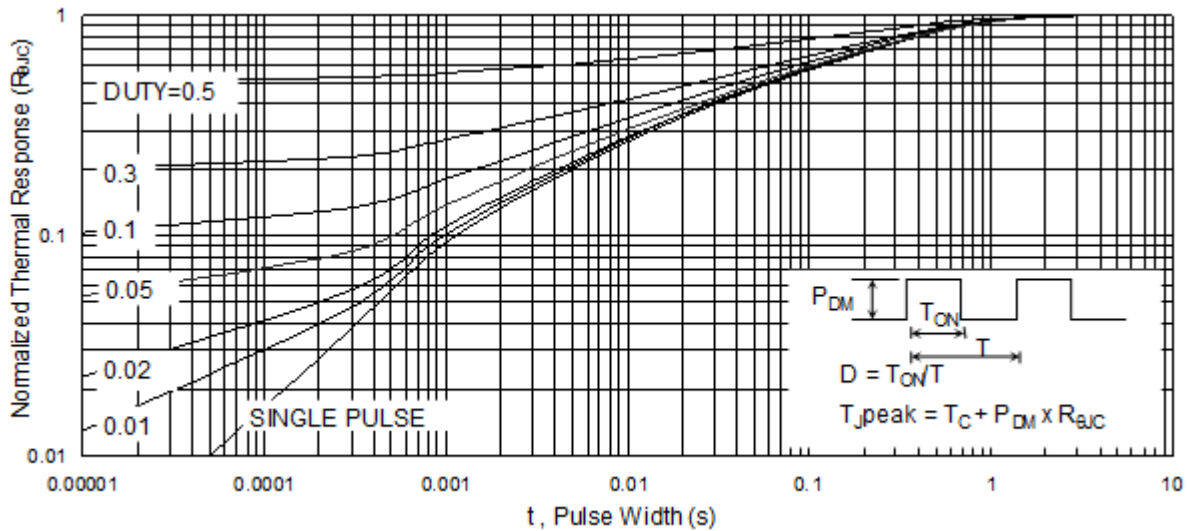


Fig.9 Normalized Maximum Transient Thermal Impedance

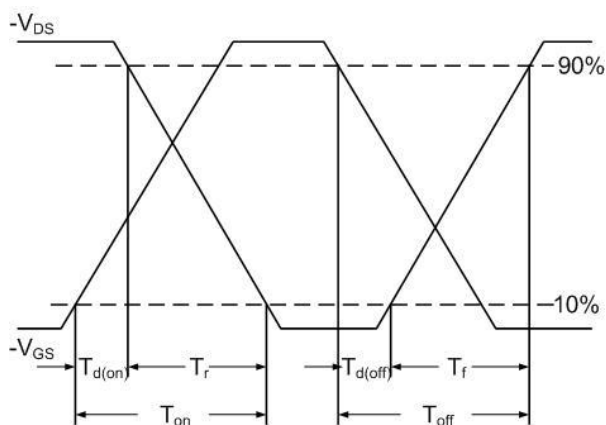


Fig.10 Switching Time Waveform

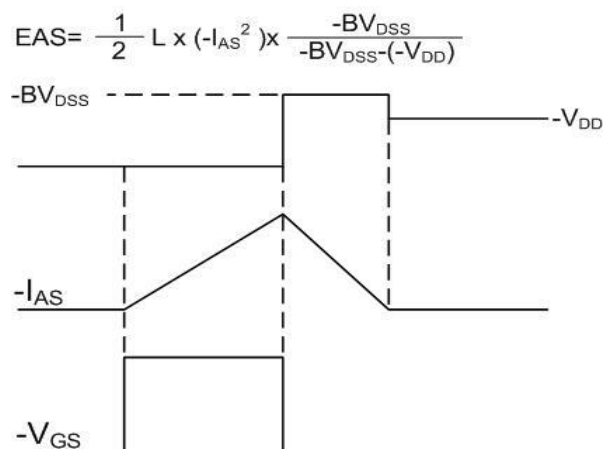
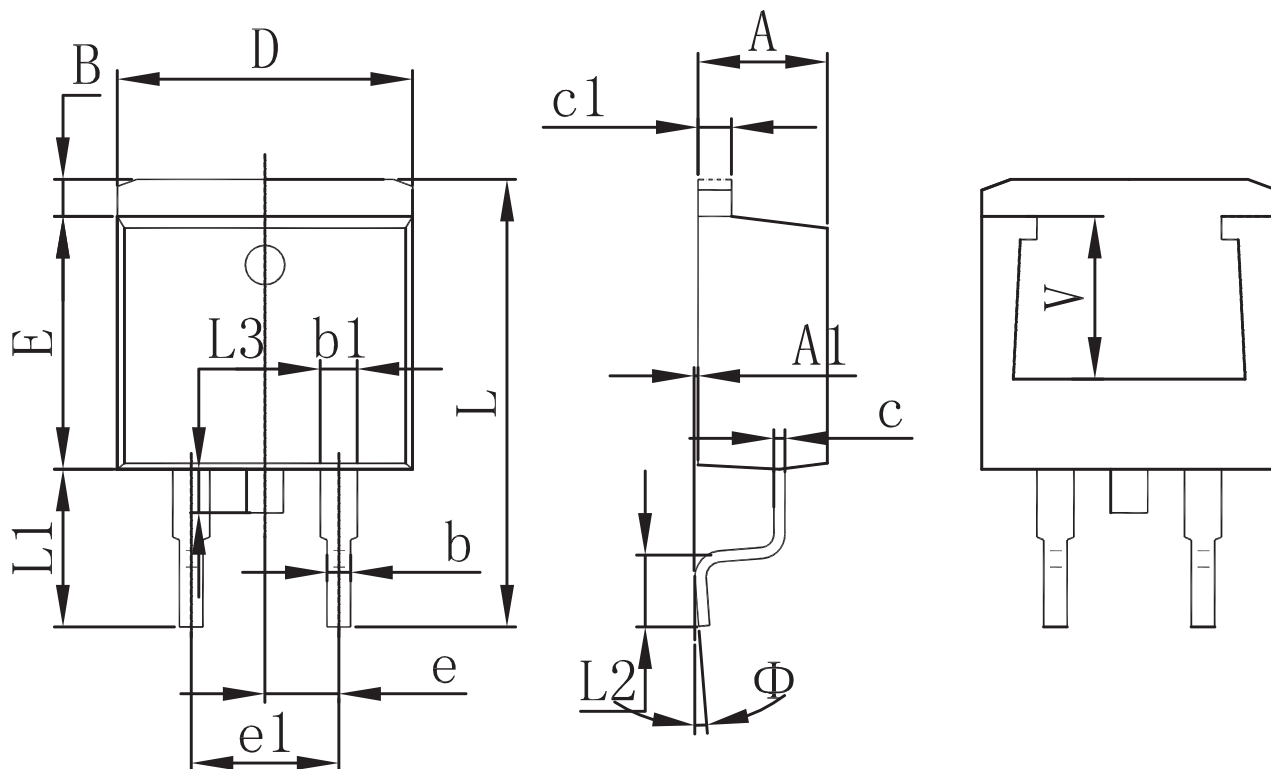


Fig.11 Unclamped Inductive Waveform

Packaging information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.470	4.670	0.176	0.184
A1	0.000	0.150	0.000	0.006
B	1.120	1.420	0.044	0.056
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
L	14.940	15.500	0.588	0.610
L1	4.950	5.450	0.195	0.215
L2	2.340	2.740	0.092	0.108
L3	1.300	1.700	0.051	0.067
Φ	0°	8°	0°	8°
V	5.600 REF.		0.220REF.	



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