

General Description

The WSK330N04G6 advanced SGT technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V.

This device is suitable for use as a Battery protection or in other Switching application.

Features

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

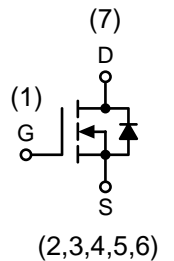
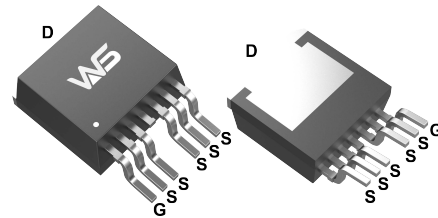
Product Summary

BV_{DSS}	$R_{DS(ON)}$	I_D
40V	1.0m Ω	330A

Applications

- Battery protection
- Load switch.
- Uninterruptible power supply

TO2 /Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	± 20	
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	330	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	212	
I_{DM}	Pulsed Drain Current ²	528	
E_{AS}	Single Pulse Avalanche Energy ³	1125	mJ
I_{AS}	Avalanche Current	150	A
$P_D@T_C=25^\circ C$	Total Power Dissipation ⁴	125	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	

Thermal Data

Symbol	Parameter	Rating	Units
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	50	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	1.0	

Electrical Characteristics (T_J=25°C, Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	40	---	---	V
ΔBV _{DSS} /ΔT _J	BV _{DSS} Temperature Coefficient	Reference to 25°C, I _D =1mA	---	0.043	---	V/°C
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =25A	---	1.0	1.5	mΩ
		V _{GS} =4.5V, I _D =15A	---	1.5	2.1	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250μA	1.0	1.8	2.5	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	-6.94	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =32V, V _{GS} =0V, T _J =25°C	---	---	2.0	μA
		V _{DS} =32V, V _{GS} =0V, T _J =55°C	---	---	10	
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
g _{fs}	Forward Transconductance	V _{DS} =10V, I _D =15A	---	47	---	S
Q _g	Total Gate Charge	V _{DS} =20V, V _{GS} =10V, I _D =20A	---	50	---	nC
Q _g	Total Gate Charge	V _{DS} =20V, V _{GS} =4.5V, I _D =20A	---	23	---	nC
Q _{gs}	Gate-Source Charge		---	9.6	---	
Q _{gd}	Gate-Drain Charge		---	8.7	---	
T _{d(on)}	Turn-on Delay Time	V _{DD} =20V, V _{GS} =10V, R _L =20Ω, R _G =16Ω, I _D =1A	---	18	---	ns
T _r	Rise Time		---	10	---	
T _{d(off)}	Turn-off Delay Time		---	57	---	
T _f	Fall Time		---	51	---	
C _{iss}	Input Capacitance	V _{DS} =20V, V _{GS} =0V, f=1.0MHz	---	9500	---	pF
C _{oss}	Output Capacitance		---	4500	---	
C _{rss}	Reverse Transfer Capacitance		---	3200	---	

Diode Characteristics

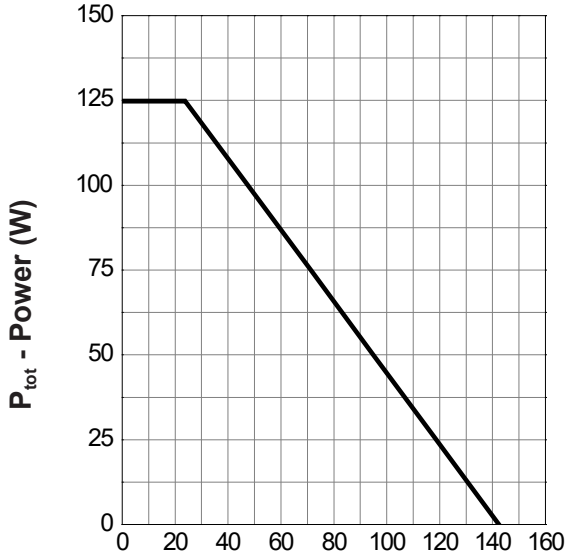
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I _S	Continuous Source Current ^{1,5}	V _G =V _D =0V, Force Current	---	---	200	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V, I _S =25A, T _J =25°C	---	---	1.3	V

Note:

- The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper.
- The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%.
- The E_{AS} data shows Max. rating. The test condition is V_{DD}=20V, V_{GS}=10V, L=0.1mH, I_{AS}=150A
- The power dissipation is limited by 150°C junction temperature.
- The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.

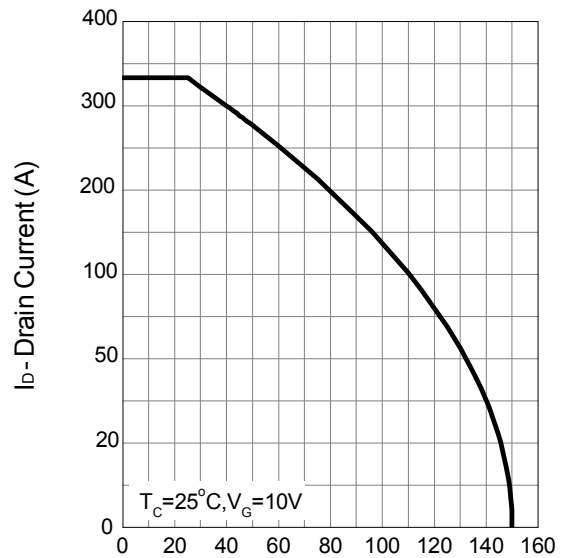
Typical Characteristics

Power Dissipation



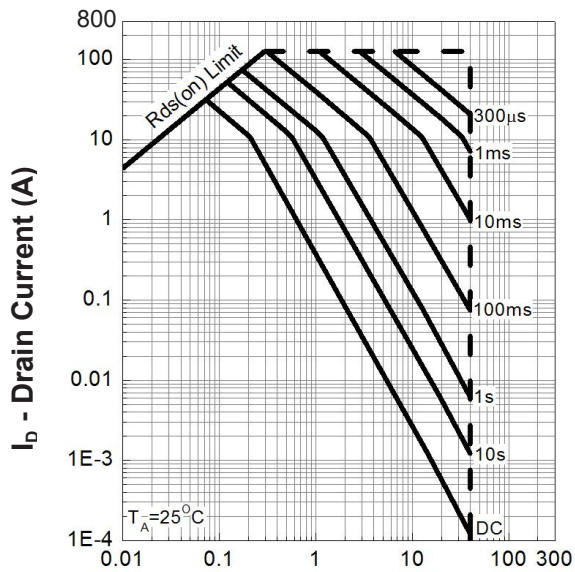
T_c - Case Temperature (°C)

Drain Current



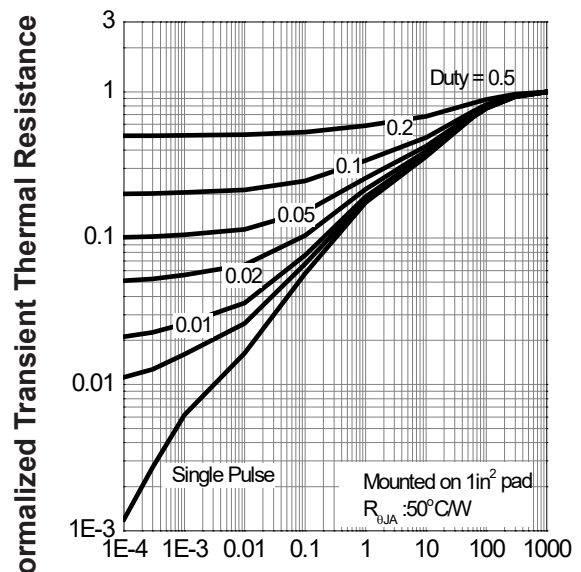
T_j - Junction Temperature (°C)

Safe Operation Area



V_{DS} - Drain - Source Voltage (V)

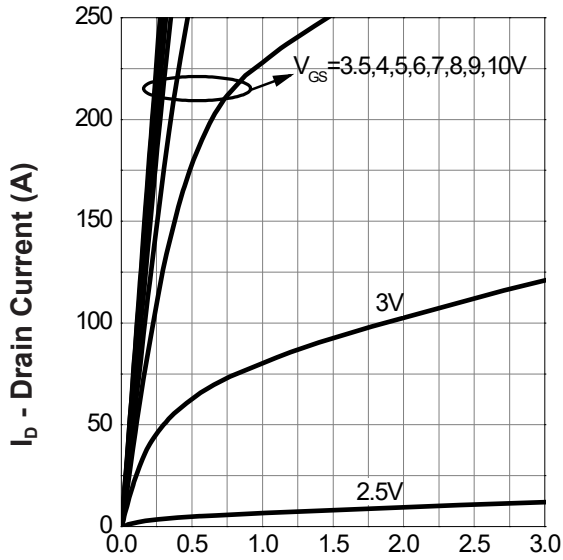
Thermal Transient Impedance



Square Wave Pulse Duration (sec)

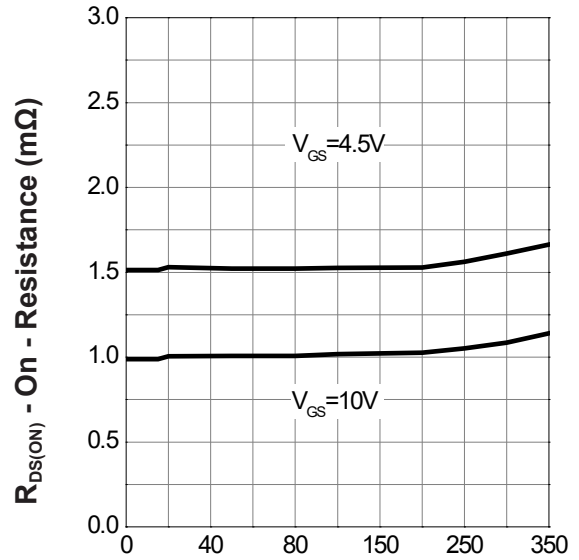
Typical Characteristics (Cont.)

Output Characteristics



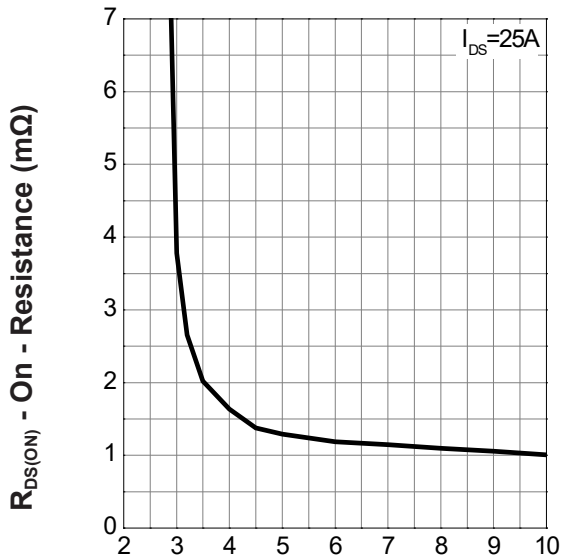
V_{DS} - Drain - Source Voltage (V)

Drain-Source On Resistance



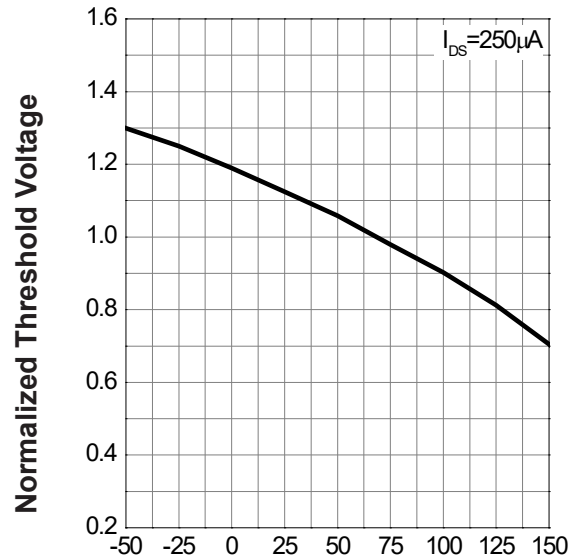
I_D - Drain Current (A)

Gate-Source On Resistance



V_{GS} - Gate - Source Voltage (V)

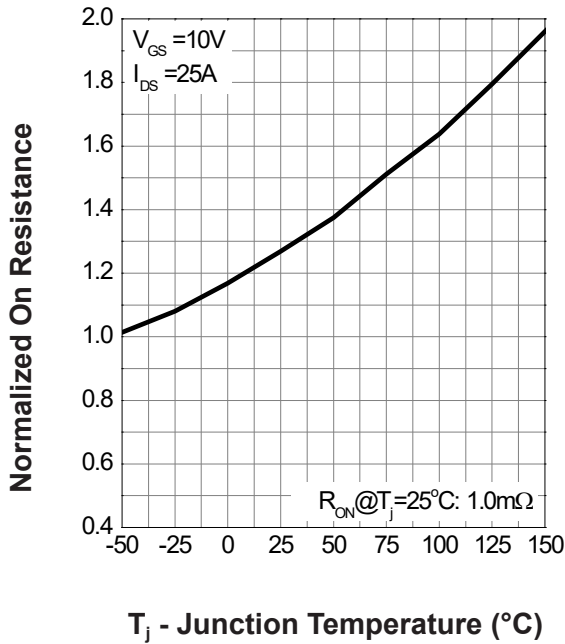
Gate Threshold Voltage



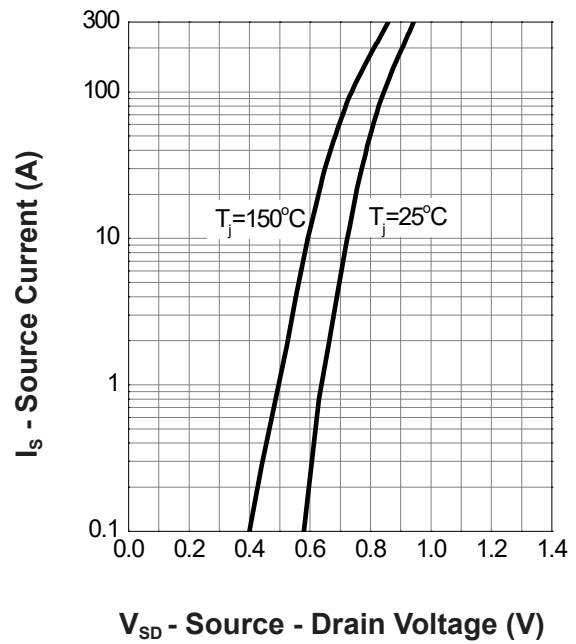
T_j - Junction Temperature ($^{\circ}C$)

Typical Characteristics (Cont.)

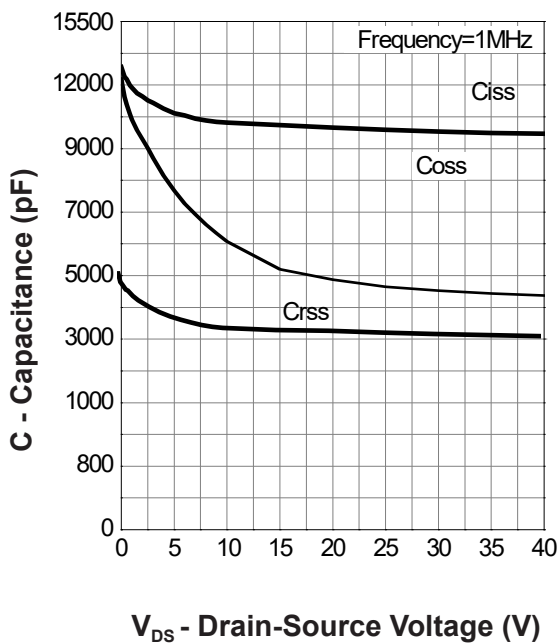
Drain-Source On Resistance



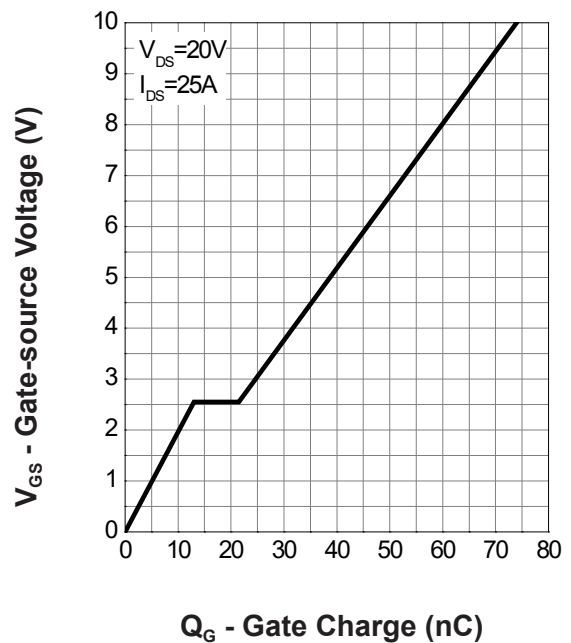
Source-Drain Diode Forward

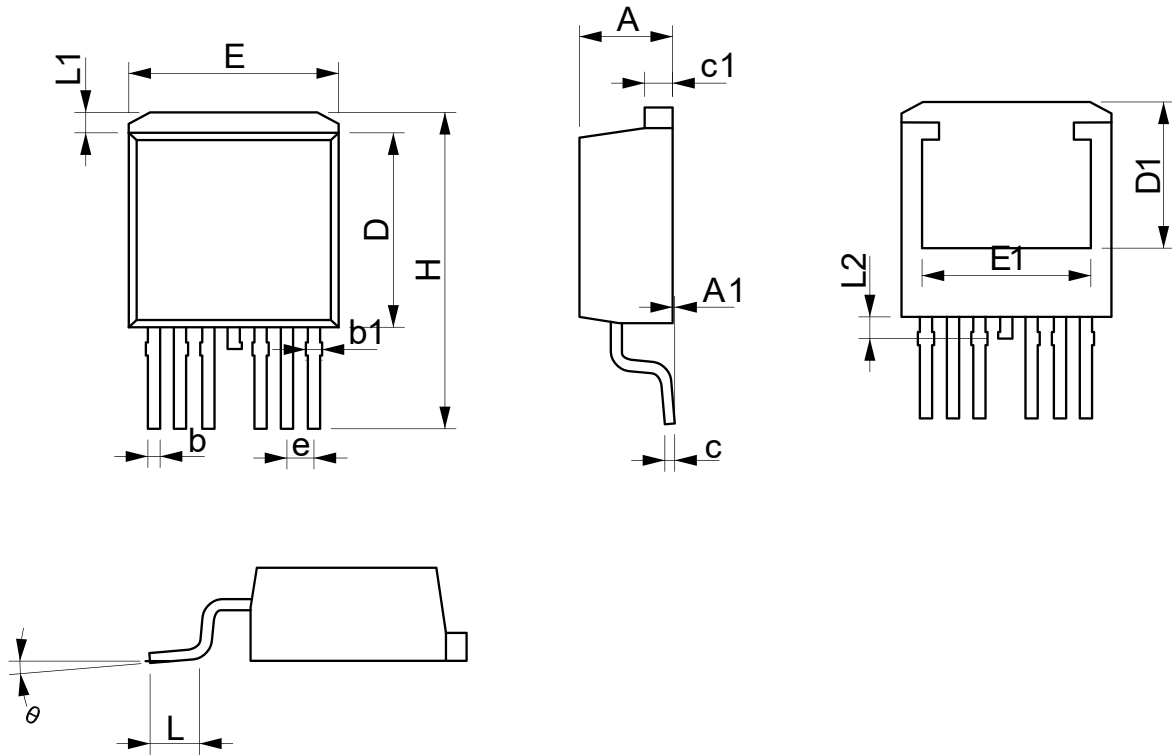


Capacitance



Gate Charge



Packaging information


SYMBOL	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.25	4.55	0.167	0.179
A1	0.01	0.25	0.000	0.010
b	0.50	0.70	0.020	0.028
b1	0.60	0.84	0.024	0.033
c	0.40	0.60	0.016	0.024
c1	1.20	1.40	0.047	0.055
D	9.05	9.45	0.356	0.372
D1	6.90	9.00	0.272	0.354
E	9.80	10.20	0.386	0.402
E1	7.25	9.00	0.285	0.354
e	1.27 BSC		0.05 BSC	
H	14.65	15.35	0.577	0.604
L	2.40	3.00	0.094	0.118
L1	0.80	1.20	0.031	0.047
L2	0.85	1.15	0.330	0.045
θ	2°	8°	2°	8°

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