

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

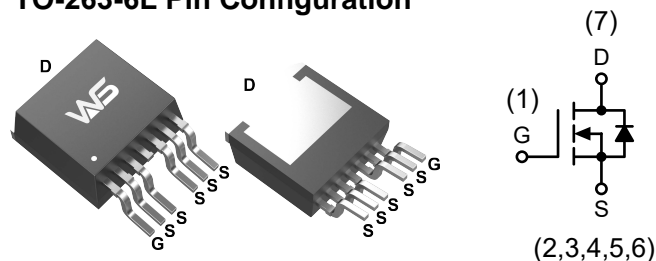
Product Summary

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

Applications

- Battery protection
- Load switch.
- Uninterruptible power supply

TO-263-6L 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 ($T_J=25^{\circ}\text{C}$, Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=250\mu A$	40	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C , $I_D=1mA$	---	0.043	---	$V/^{\circ}\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10V$, $I_D=25A$	---	1.0	1.5	m Ω
		$V_{GS}=4.5V$, $I_D=15A$	---	1.5	2.1	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	1.0	1.8	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-6.94	---	$mV/^{\circ}\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=32V$, $V_{GS}=0V$, $T_J=25^{\circ}\text{C}$	---	---	2.0	μA
		$V_{DS}=32V$, $V_{GS}=0V$, $T_J=55^{\circ}\text{C}$	---	---	10	
I_{GSS}	Gate-Body Leakage Current	$V_{GS}=\pm 20V$, $V_{DS}=0V$	---	---	± 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	$V_{DD}=20V$, $V_{GS}=10V$, $R_L=20\Omega$, $R_G=16\Omega$, $I_D=1A$	---	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

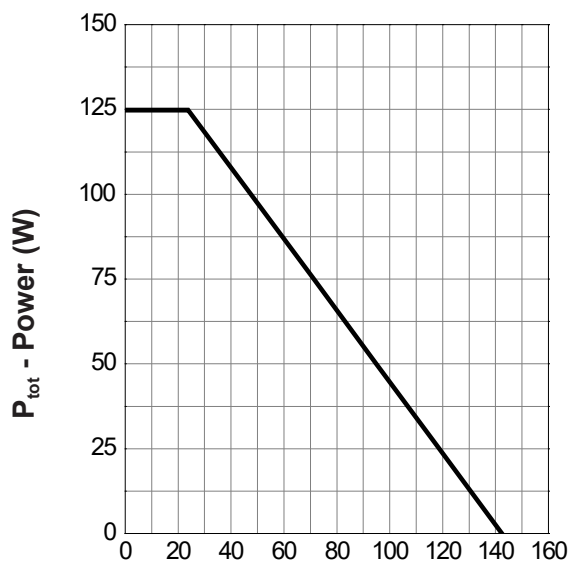
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I_S	Continuous Source Current ^{1,5}	$V_G=V_D=0V$, Force Current	---	---	200	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V$, $I_S=25A$, $T_J=25^{\circ}\text{C}$	---	---	1.3	V

Note:

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

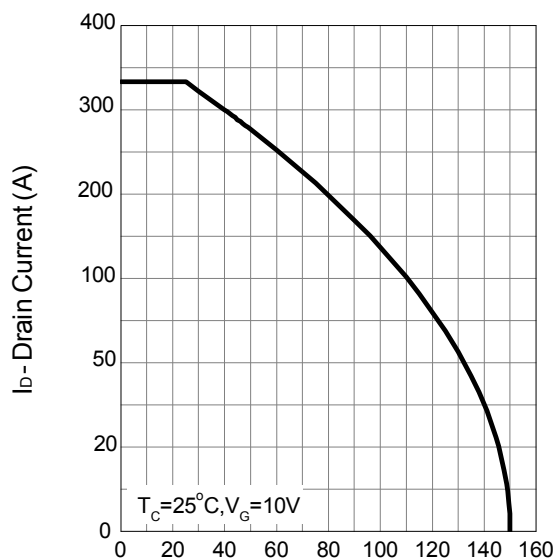
Typical Characteristics

Power Dissipation



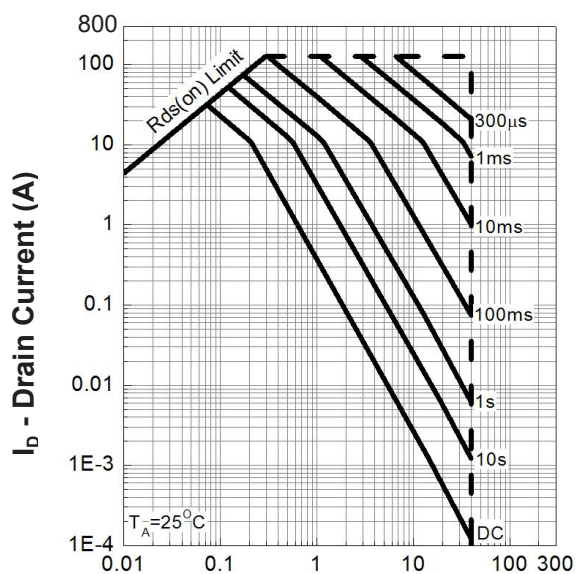
T_c - Case Temperature ($^{\circ}\text{C}$)

Drain Current



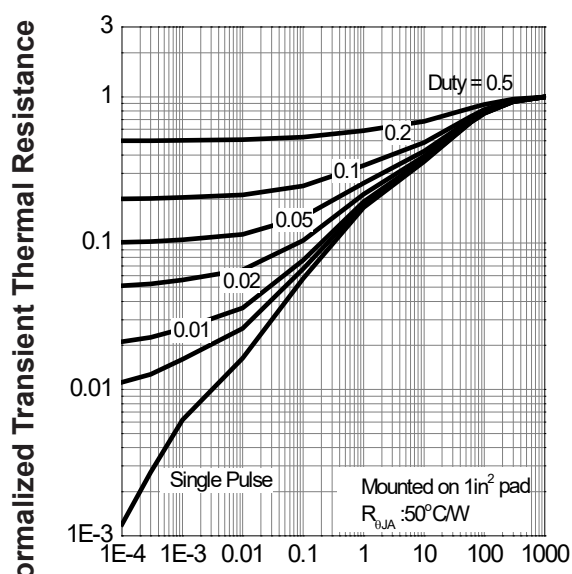
T_j - Junction Temperature ($^{\circ}\text{C}$)

Safe Operation Area



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

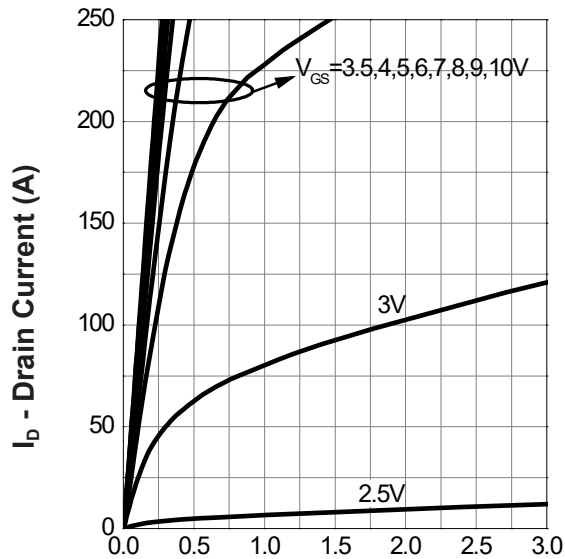
Thermal Transient Impedance



Square Wave Pulse Duration (sec)

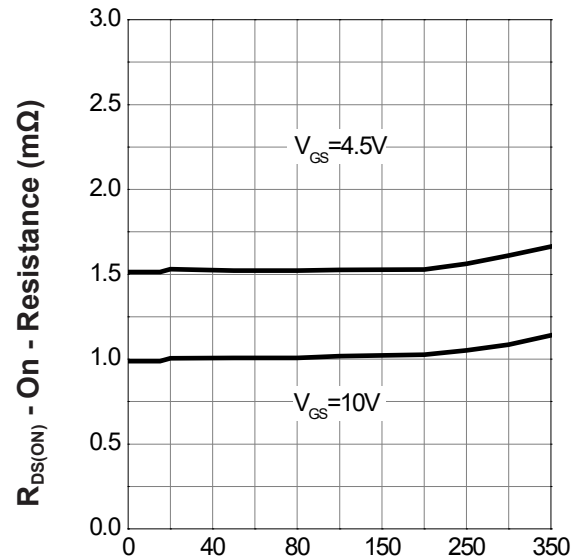
Typical Characteristics (Cont.)

Output Characteristics



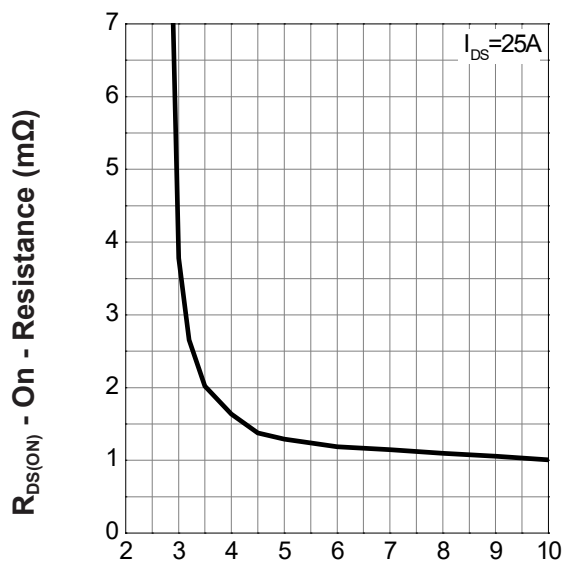
V_{DS} - Drain - Source Voltage (V)

Drain-Source On Resistance



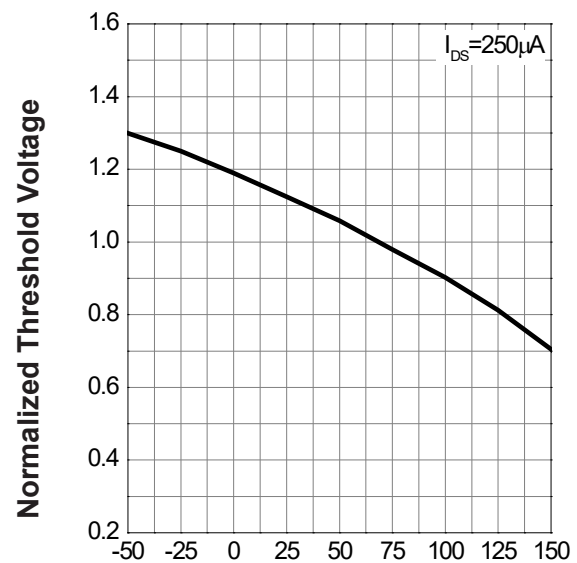
I_D - Drain Current (A)

Gate-Source On Resistance

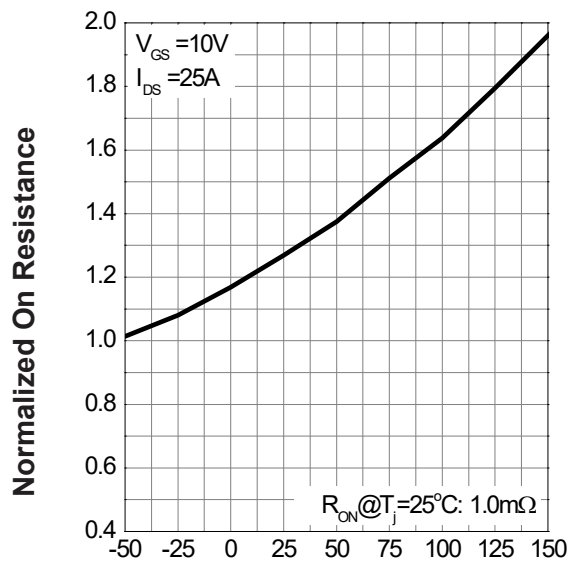
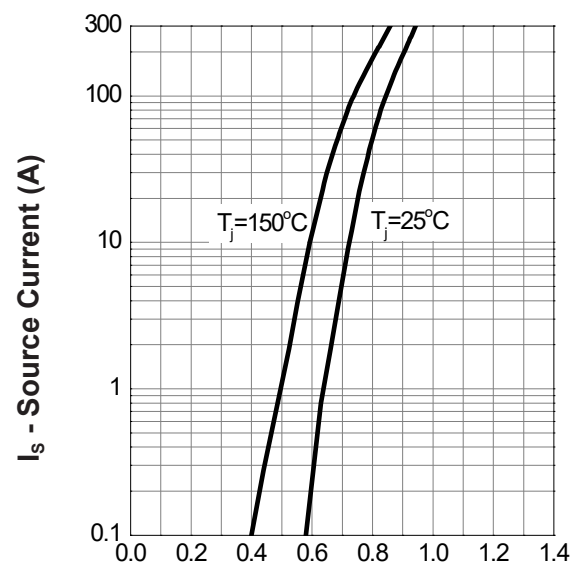
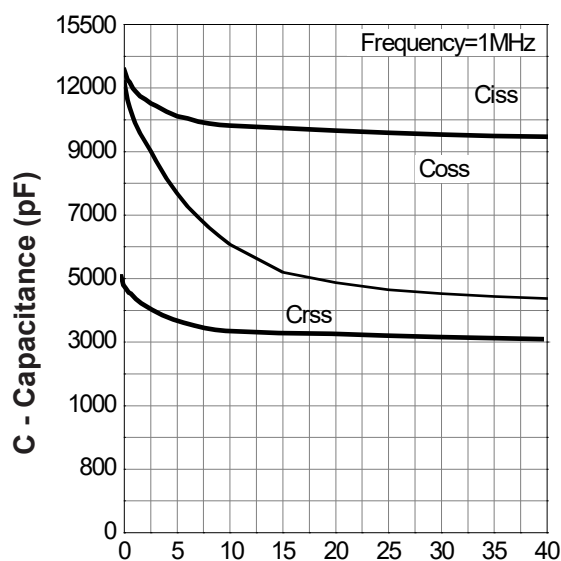
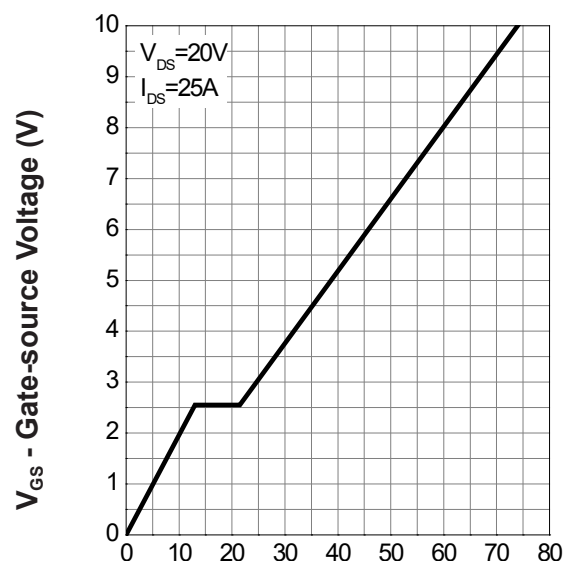


V_{GS} - Gate - Source Voltage (V)

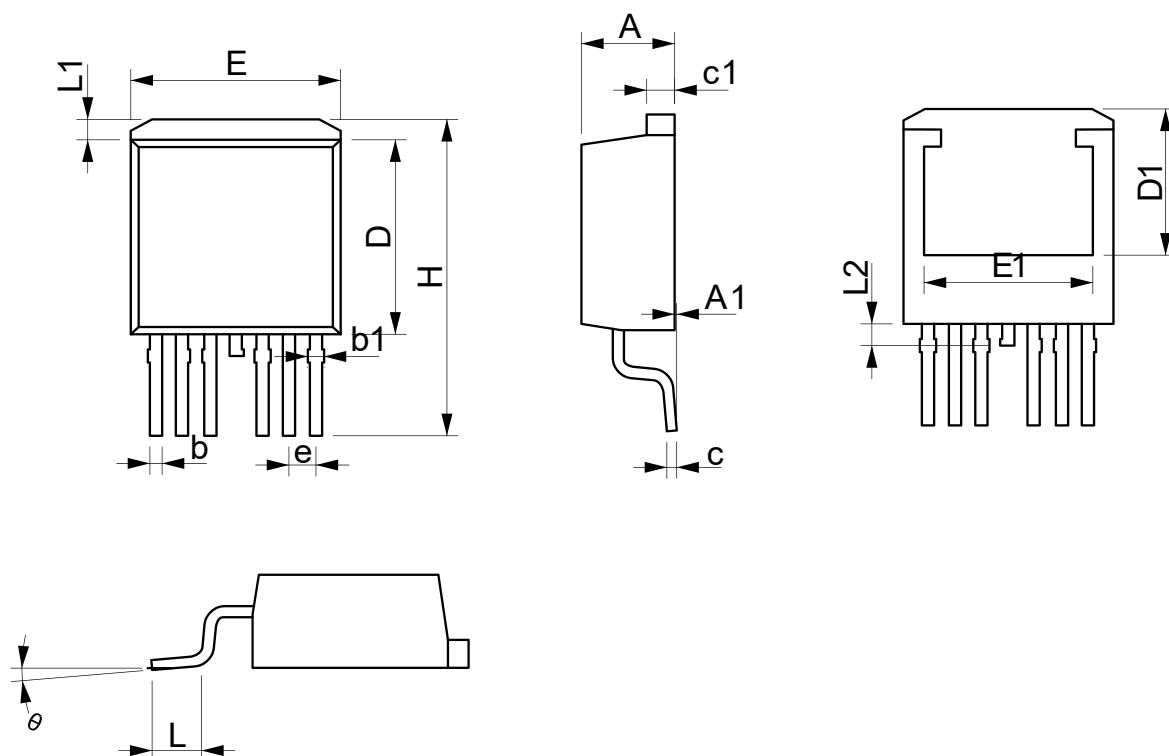
Gate Threshold Voltage



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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