

General Description

The WSR135N15 is the highest performance trench N-Ch MOSFET with extreme high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The WSR135N15 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

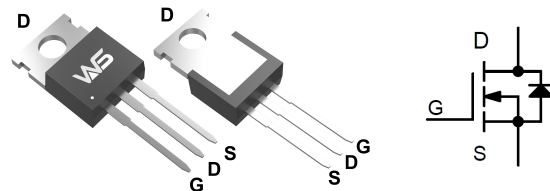
Product Summary

BV_{DSS}	R_{DSON}	I_D
150V	9.5mΩ	135A

Applications

- Power Management in TV Converter.
- DC-DC Converter
- LED TV Back Light

TO-220AB Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	150	V
V_{GS}	Gate-Source Voltage	±20	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	135	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	80	A
I_{DM}	Pulsed Drain Current ² , $T_C=25^\circ C$	360	A
EAS	Avalanche Energy, Single pulse, $L=0.5mH$	406	mJ
I_{AS}	Avalanche Current, Single pulse, $L=0.5mH$	43	A
$P_D@T_C=25^\circ C$	Total Power Dissipation ⁴	160	W
$P_D@T_C=100^\circ C$	Total Power Dissipation ⁴	75	W
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	150	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	---	62	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	0.78	°C/W

Electrical Characteristics (T_J=25 °C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	150	---	---	V
ΔBV _{DSS} /ΔT _J	BV _{DSS} Temperature Coefficient	Reference to 25°C, I _D =1mA	---	0.096	---	V/°C
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =30A	---	9.5	12	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250μA	2.5	3.5	4.5	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	-5.5	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =100V, V _{GS} =0V, T _J =25°C	---	---	1	μA
		V _{DS} =100V, V _{GS} =0V, T _J =55°C	---	---	100	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
g _{fs}	Forward Transconductance	V _{DS} =5V, I _D =30A	---	40	---	S
R _g	Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	1.7	2.8	Ω
Q _g	Total Gate Charge (10V)	V _{DS} =80V, V _{GS} =10V, I _D =40A	---	66	---	nC
Q _{gs}	Gate-Source Charge		---	26	---	
Q _{gd}	Gate-Drain Charge		---	17	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} =80V, V _{GS} =10V, R _G =2Ω, I _D =40A	---	36	---	ns
T _r	Rise Time		---	95	---	
T _{d(off)}	Turn-Off Delay Time		---	56	---	
T _f	Fall Time		---	11	---	
C _{iss}	Input Capacitance	V _{DS} =25V, V _{GS} =0V, f=1MHz	---	5460	---	pF
C _{oss}	Output Capacitance		---	1711	---	
C _{rss}	Reverse Transfer Capacitance		---	189	---	

Guaranteed Avalanche Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy ⁵	V _{DD} =25V, L=0.5mH, I _{AS} =43A	200	---	---	mJ

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current ^{1,6}	V _G =V _D =0V, Force Current	---	---	120	A
I _{SM}	Pulsed Source Current ^{2,6}		---	---	406	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V, I _S =20A, T _J =25°C	---	---	1.3	V
t _{rr}	Reverse Recovery Time	I _F =40A, dI/dt=100A/μs, T _J =25°C	---	76	---	nS
Q _{rr}	Reverse Recovery Charge		---	285	---	nC

Note :

- The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper, t<10sec.
- The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
- The EAS data shows Max. rating. The test condition is V_{DS}=25V, V_{GS}=10V, L=0.5mH, I_{AS}=43A
- The power dissipation is limited by 150°C junction temperature
- The Min. value is 100% EAS tested guarantee.
- The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.

Typical Operating Characteristics

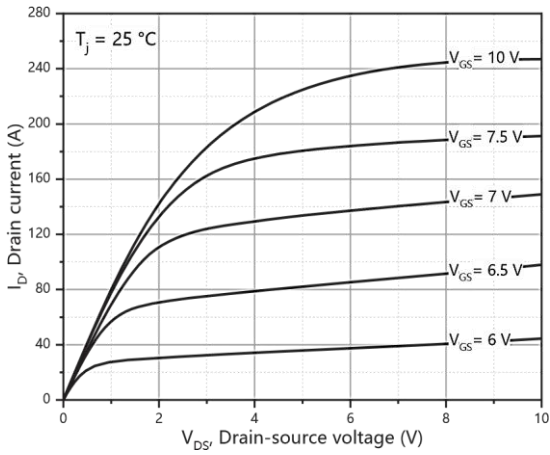


Figure 1. Type. output characteristics

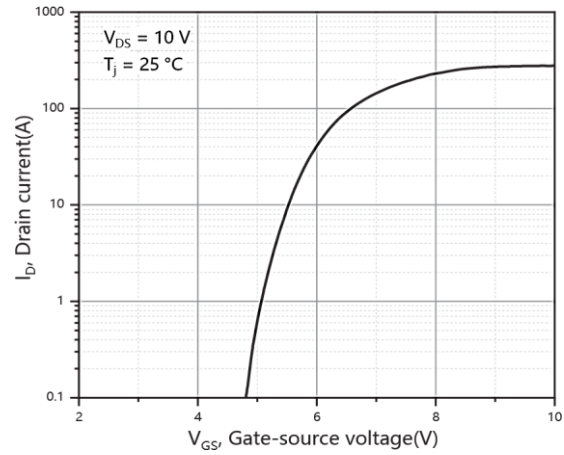


Figure 2. Type. transfer characteristics

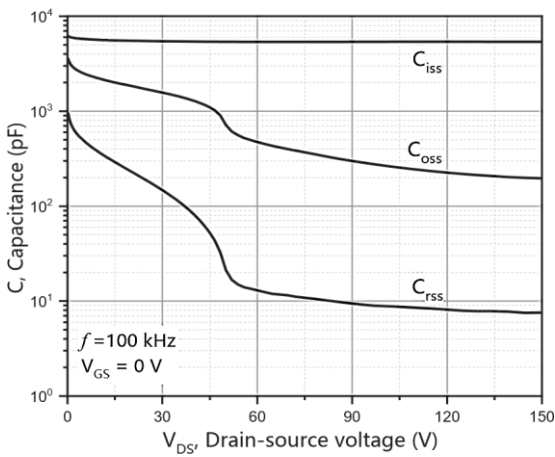


Figure 3. Type. capacitances

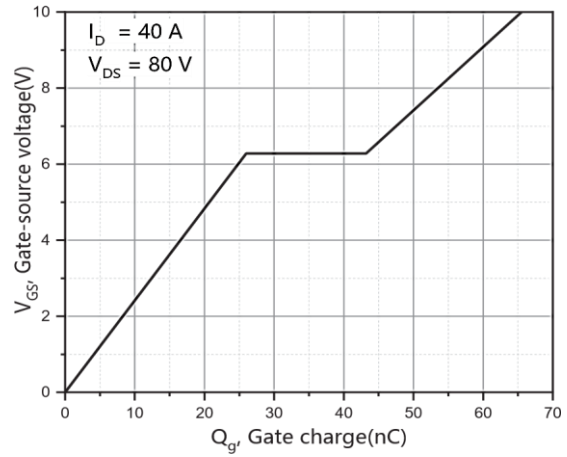


Figure 4. Type. gate charge

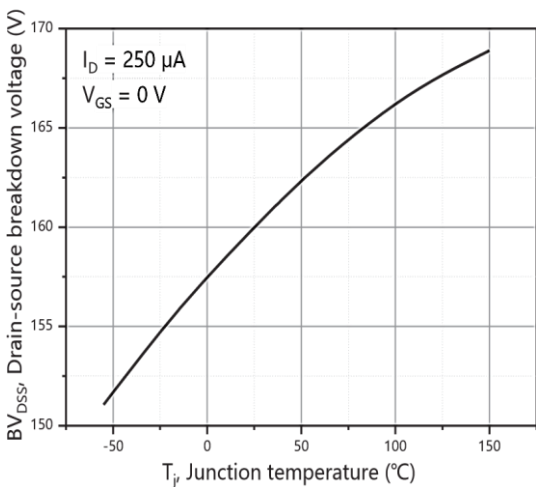


Figure 5. Drain-source breakdown voltage

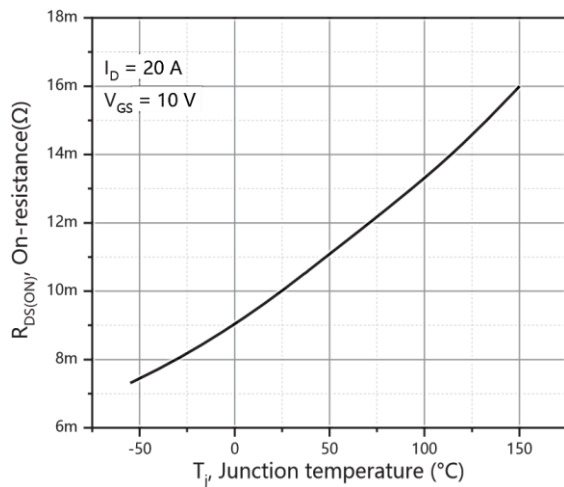


Figure 6. Drain-source on-state resistance

Typical Operating Characteristics (Cont.)

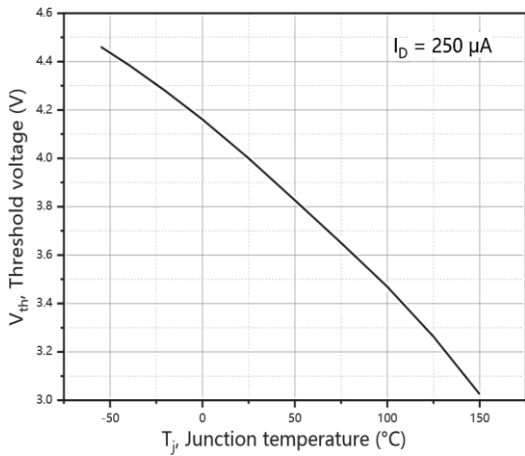


Figure 7. Threshold voltage

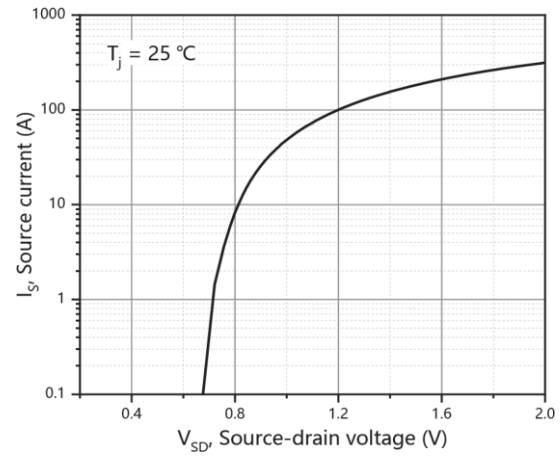


Figure 8. Forward characteristic of body diode

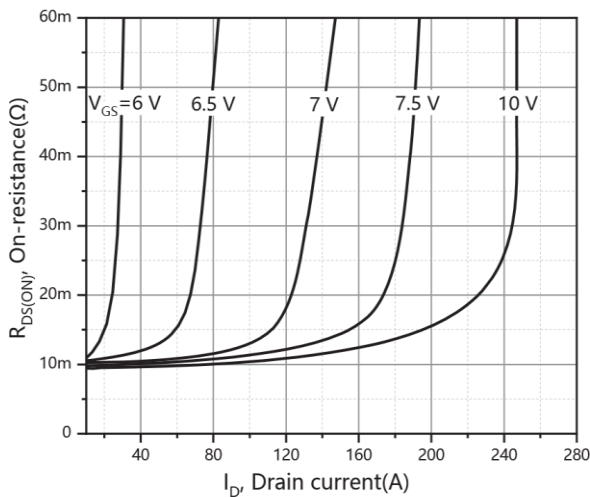


Figure 9. Drain-source on-state resistance

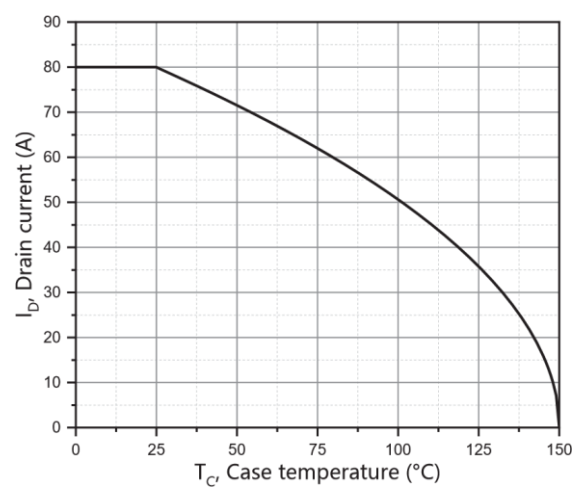


Figure 10. Drain current

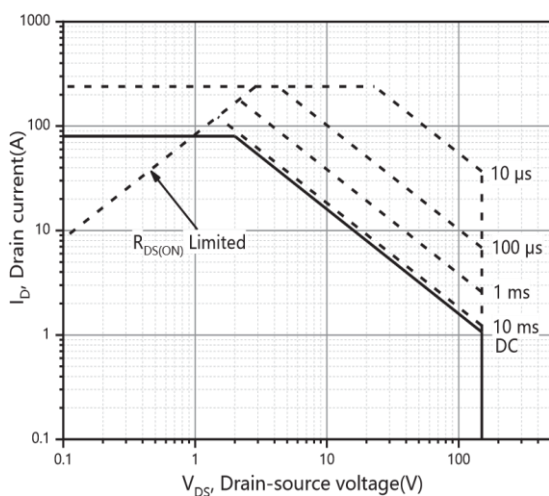


Figure 11. Safe operation area $T_C=25^\circ\text{C}$

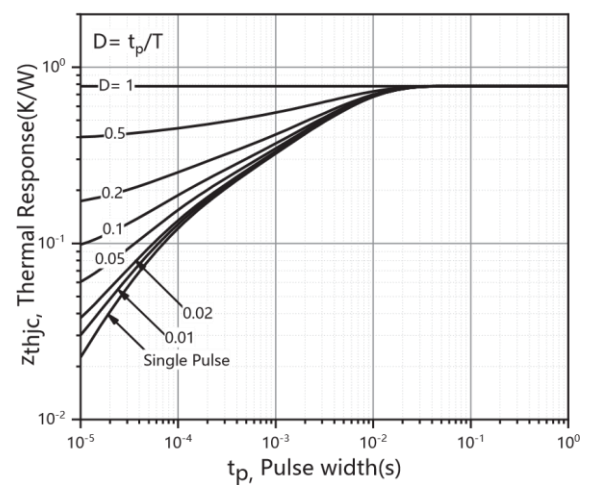
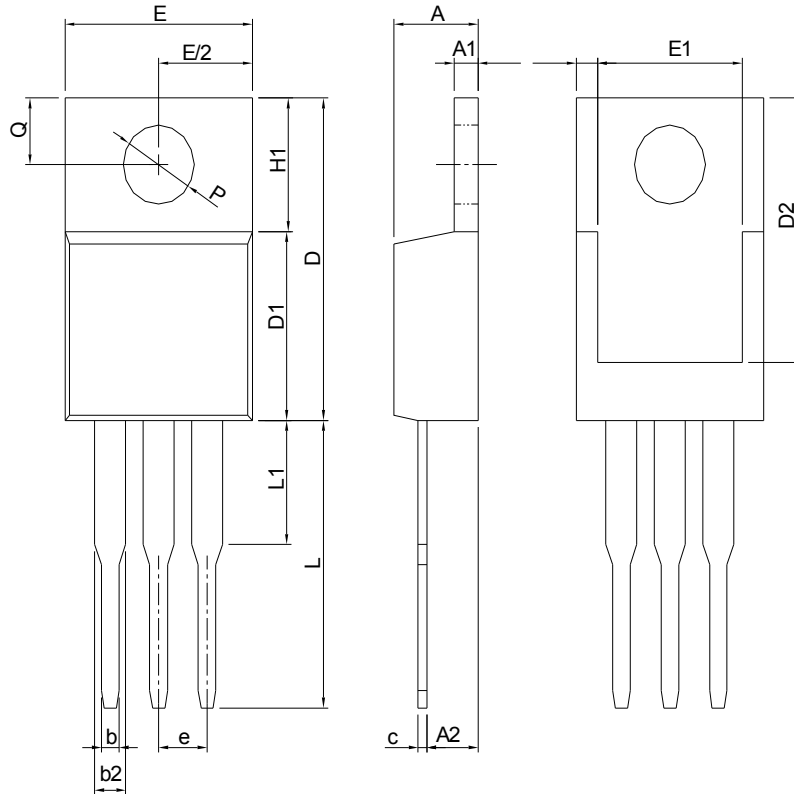
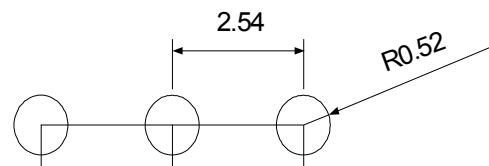


Figure 12. Max. transient thermal impedance

Package Information TO-220AB


DIMENSIONS	TO-220			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	3.56	4.83	0.140	0.190
A1	0.51	1.40	0.020	0.055
A2	2.03	2.92	0.080	0.115
b	0.38	1.02	0.015	0.040
b2	1.14	1.78	0.045	0.070
c	0.36	0.61	0.014	0.024
D	14.22	16.51	0.560	0.650
D1	8.38	9.02	0.330	0.355
D2	12.19	13.65	0.480	0.537
E	9.65	10.67	0.380	0.420
E1	6.86	8.89	0.270	0.350
e	2.54 BSC		0.100 BSC	
H1	5.84	6.86	0.230	0.270
L	12.70	14.73	0.500	0.580
L1		6.35		0.250
P	3.53	4.09	0.139	0.161
Q	2.54	3.43	0.100	0.135

RECOMMENDED LAND PATTERN


UNIT: mm



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