

## General Description

The WSR140N12 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 WSR140N12 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

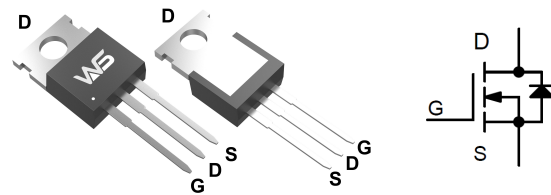
## Product Summary

BVDSS	RDSON	ID
120V	5mΩ	140A

## Applications

- High Frequency Point-of-Load Synchronous Buck Converter
- Networking DC-DC Power System

## TO-220-3L Pin Configuration



## Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	120	V
V <sub>GS</sub>	Gate-Source Voltage	±20	V
I <sub>D</sub>	Continuous Drain Current, V <sub>GS</sub> @ 10V(T <sub>C</sub> =25°C)	140	A
I <sub>DM</sub>	Pulsed Drain Current	330	A
EAS	Single Pulse Avalanche Energy	400	mJ
P <sub>D</sub>	Total Power Dissipation... c=25°C)	192	W
RθJA	Thermal resistance, junction-ambient	62	°C/W
RθJC	Thermal resistance, junction-case	0.65	°C/W
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	°C

**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	120	---	---	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =30A	---	5.0	6.5	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	2.0	---	4.0	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =120V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>D</sub> =15A	---	68.9	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	18.1	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	15.9	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =50V, V <sub>GS</sub> =10V R <sub>G</sub> =2Ω, I <sub>D</sub> =25A	---	30.3	---	ns
T <sub>r</sub>	Rise Time		---	33.0	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	59.5	---	
T <sub>f</sub>	Fall Time		---	11.7	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz	---	5823	---	pF
C <sub>oss</sub>	Output Capacitance		---	778.3	---	
C <sub>riss</sub>	Reverse Transfer Capacitance		---	17.5	---	

**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,6</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	150	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,6</sup>		---	---	330	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =25A, T <sub>J</sub> =25°C	---	---	1.3	V

**■ Note**

- 1) Repetitive rating; pulse width limited by max. junction temperature.
- 2) Pd is based on max. junction temperature, using junction-case thermal resistance.
- 3) The value of RθJA is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T<sub>a</sub>=25 °C.
- 4) V<sub>DD</sub>=50 V, R<sub>G</sub>=50 Ω, L=0.3 mH, starting T<sub>J</sub>=25 °C.
- 5) Calculated continuous current based on maximum allowable junction temperature.

**Typical Operating Characteristics**

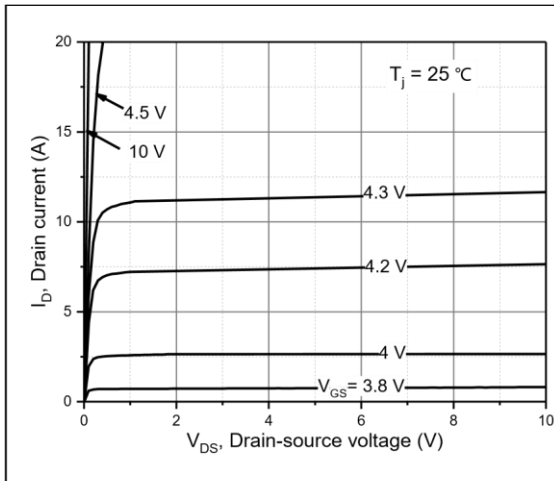


Figure 1, Typ. output characteristics

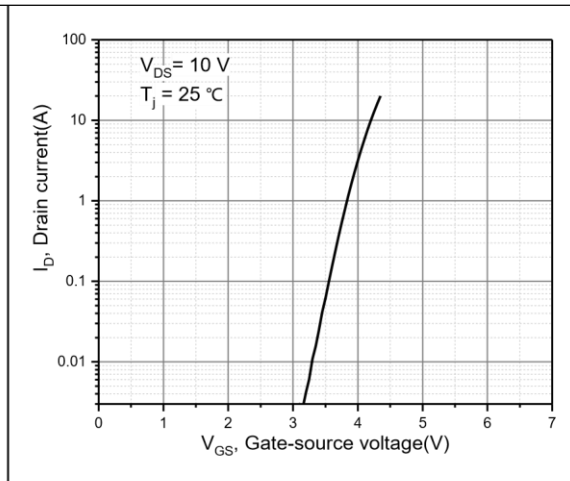


Figure 2, Typ. transfer characteristics

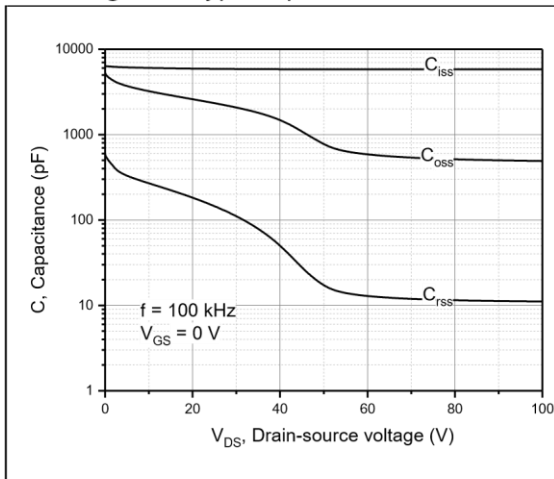


Figure 3, Typ. capacitances

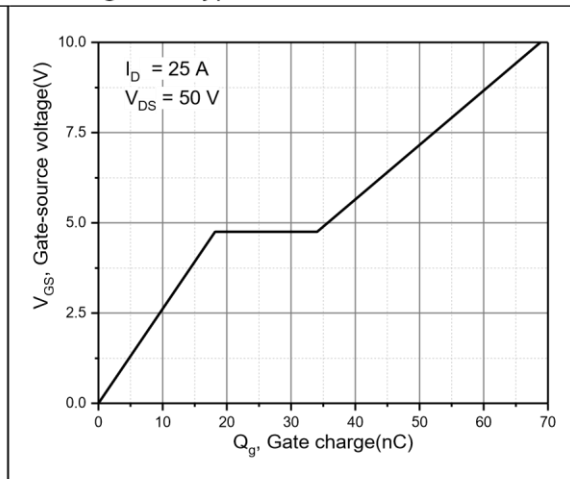


Figure 4, Typ. gate charge

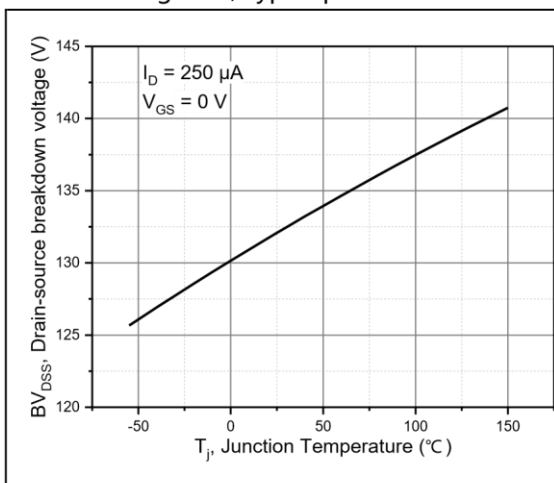


Figure 5, Drain-source breakdown voltage

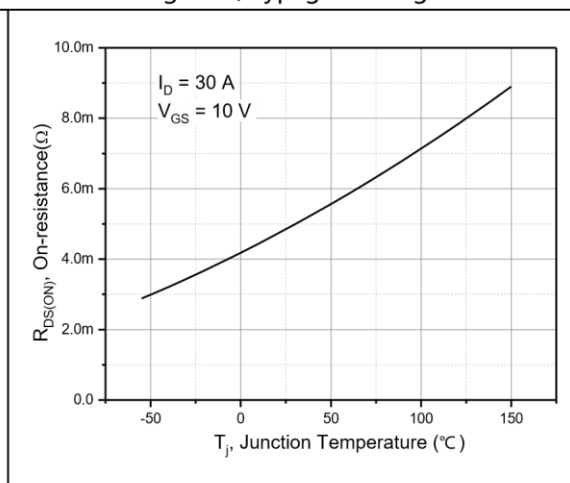


Figure 6, Drain-source on-state resistance

**Typical Operating Characteristics**

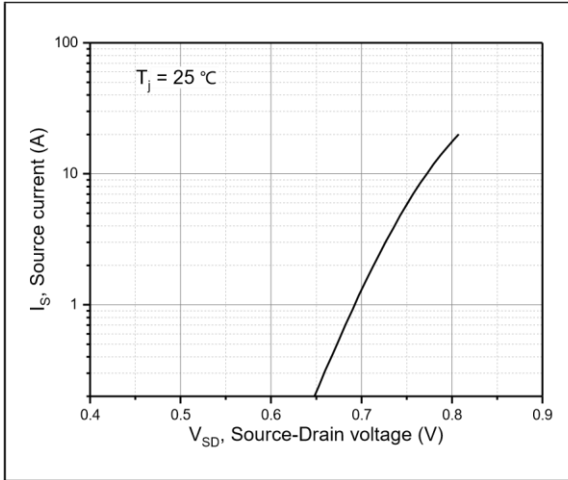


Figure 7, Forward characteristic of body diode

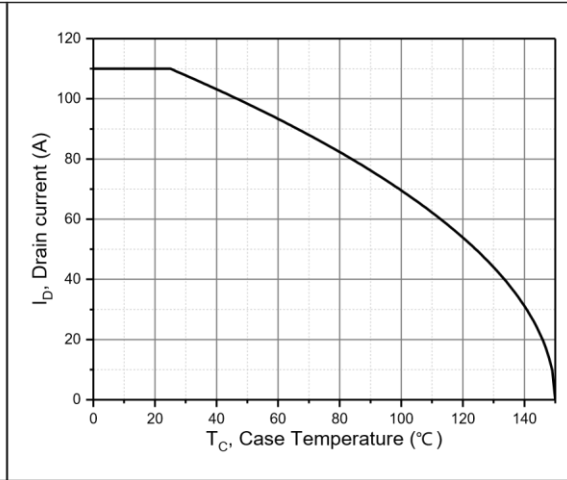


Figure 8, Drain current

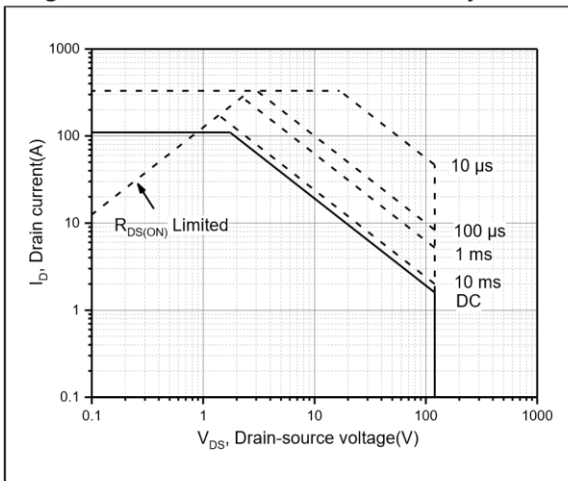
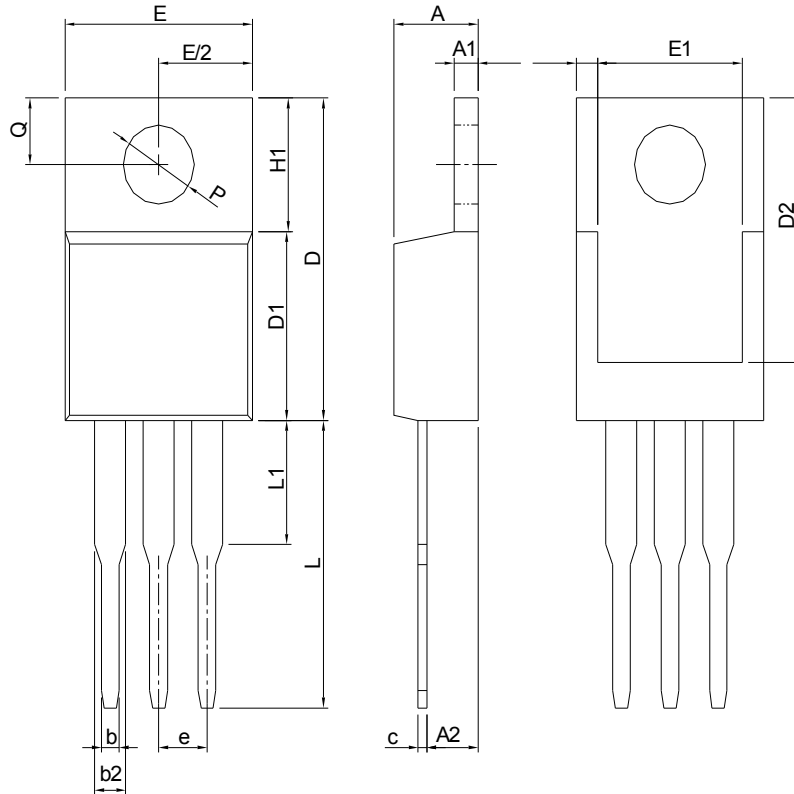
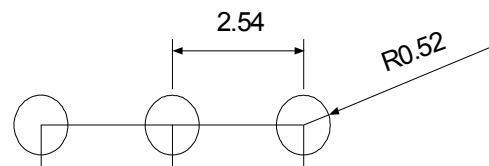


Figure 9, Safe operation area  $T_C=25\text{ }^\circ\text{C}$

**Package Information TO-220-3L**


DIMENSIONS	TO-220-3L			
	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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