NCE N-Channel Super Trench III Power MOSFET

Description

The series of devices uses **Super Trench III** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Q_g. This device is ideal for high-frequency switching and synchronous rectification.

Application

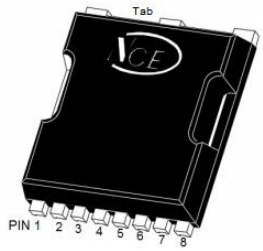
- High-frequency Switching and Synchronous Rectification
- DC/DC and AC/DC Converter
- Motor Driver
- Battery Management System (BMS)

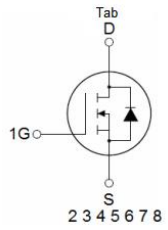
General Features

- V_{DS} =100V,I_D =391A
  $R_{DS(ON)}$=1.1mΩ , typical @ V_{GS}=10V
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 175 °C operating temperature
- Pb-free lead plating

100% UIS TESTED!
100% ΔVds TESTED!

TOLL-8L





Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCEP015NH100LL	NCEP015NH100LL	TOLL-8L	Ø330mm	24mm	2000 units

Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous (T_C=25℃)	I_D (T_C=25℃)	391	A
Drain Current-Continuous(T_C=100℃)	I_D (T_C=100℃)	274	A
Pulsed Drain Current	I_{DM}	1564	A
Maximum Power Dissipation (T_C=25℃)	P_D (T_C=25℃)	405	W
Derating factor		2.7	W/℃
Single pulse avalanche energy (Note 1)	E_{AS}	3136	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 175	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	0.37	℃/W
Thermal Resistance,Junction-to-Ambient (Note4)	$R_{\theta JA}$	40	℃/W

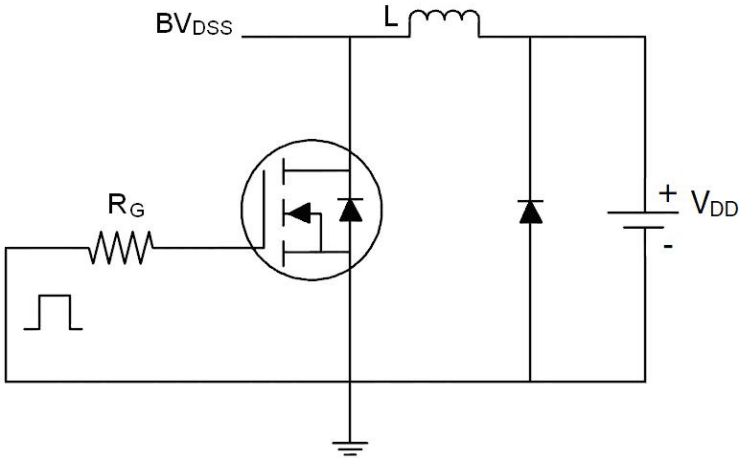
Electrical Characteristics (T_C=25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	100	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=100V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	2.0	-	4.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=20A	-	1.1	1.35	mΩ
Gate resistance	R_G	F=1.0MHz	-	1.1	-	Ω
Forward Transconductance	g_{FS}	V_{DS}=10V,I_D=40A	-	60	-	S
Dynamic Characteristics						
Input Capacitance	C_{lss}	V_{DS}=50V,V_{GS}=0V, F=1.0MHz	-	11800	-	pF
Output Capacitance	C_{oss}		-	5600	-	pF
Reverse Transfer Capacitance	C_{rss}		-	114	-	pF
Switching Characteristics (Note 2)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=50V,I_D=40A V_{GS}=10V,R_G=1.6Ω	-	27	-	nS
Turn-on Rise Time	t_r		-	17	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	55	-	nS
Turn-Off Fall Time	t_f		-	17	-	nS
Total Gate Charge	Q_g	V_{DS}=50V,I_D=20A, V_{GS}=10V	-	194	-	nC
Gate-Source Charge	Q_{gs}		-	52	-	nC
Gate-Drain Charge	Q_{gd}		-	54	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_S=20A	-	-	1.2	V
Diode Forward Current	I_S		-	-	391	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_F = 100A di/dt = 100A/μs	-	104	-	nS
Reverse Recovery Charge	Qrr		-	240	-	nC

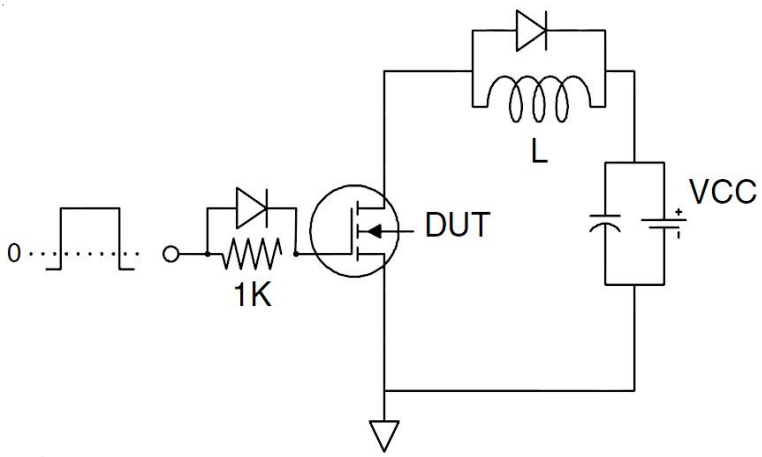
1. EAS condition : Tj=25℃,V_{DD}=50V,V_G=10V,L=0.5mH,Rg=25Ω
2. Guaranteed by design, not subject to production
3. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of TJ(MAX)=175°C. The SOA curve provides a single pulse rating.
4. The value of $R_{\theta JA}$ is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25° C. The value in any given application depends on the user's specific board design, and the maximum temperature of 175° C may be used if the PCB allows it.

Test Circuit

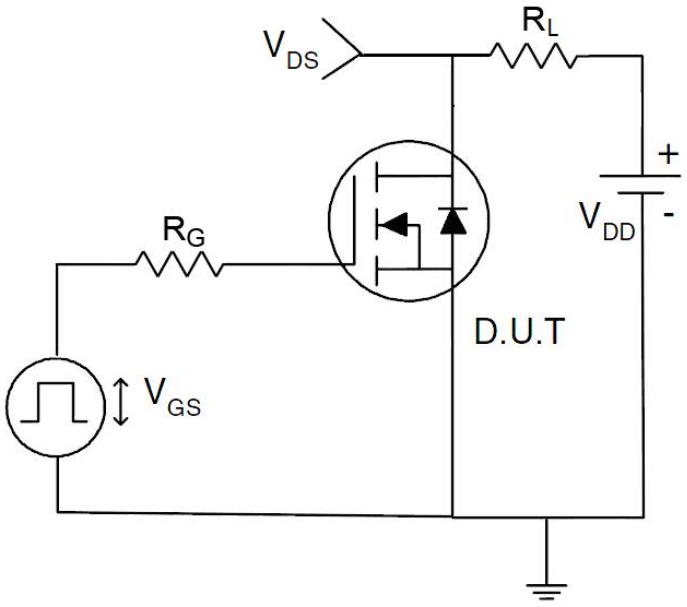
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics

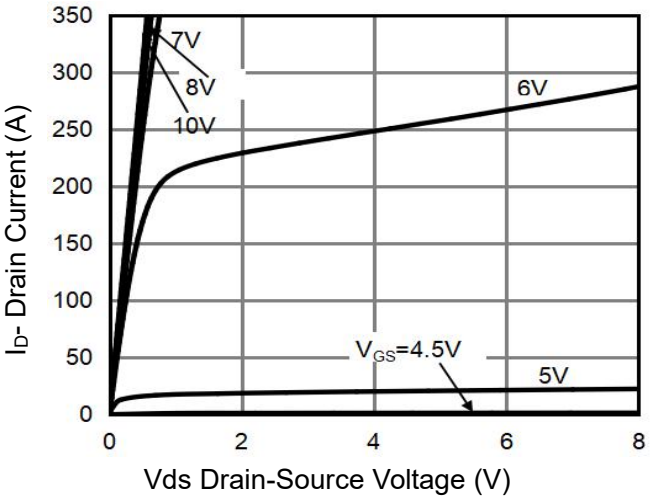


Figure 1 Output Characteristics

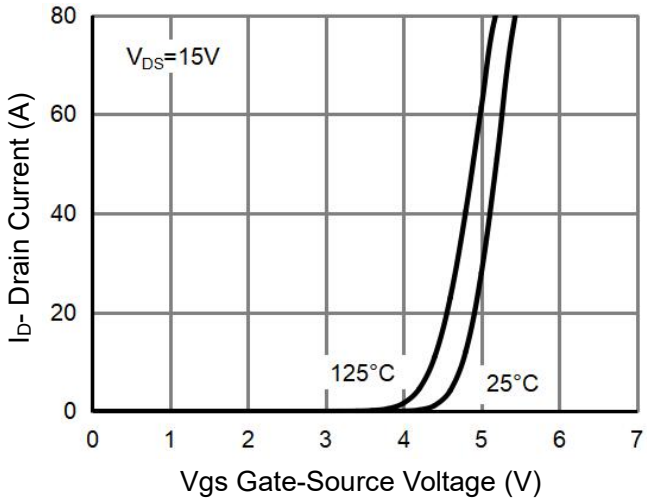


Figure 2 Transfer Characteristics

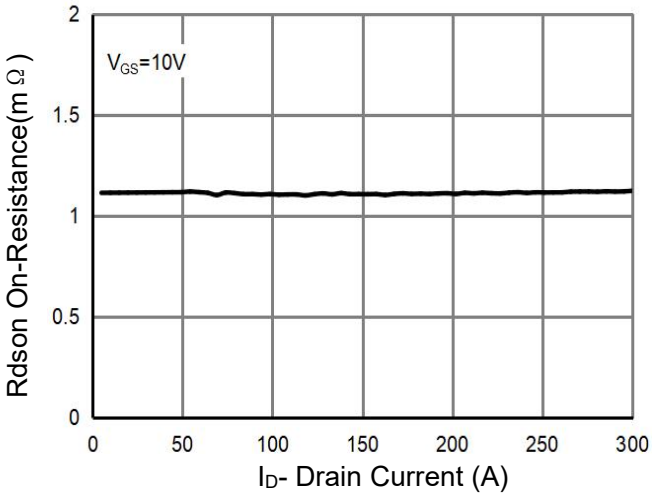


Figure 3 Rdson- Drain Current

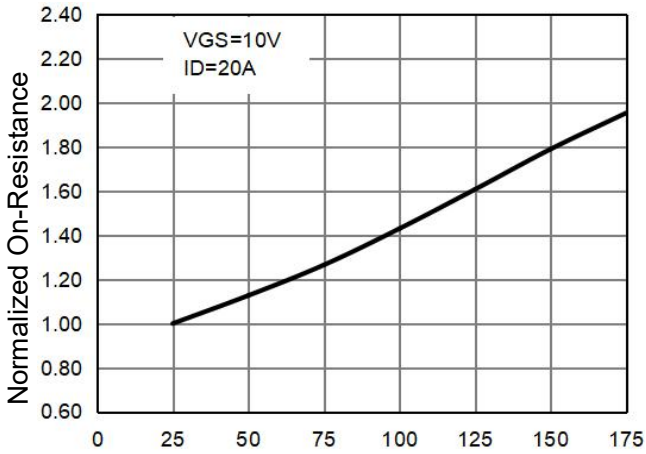


Figure 4 Rdson-Junction Temperature

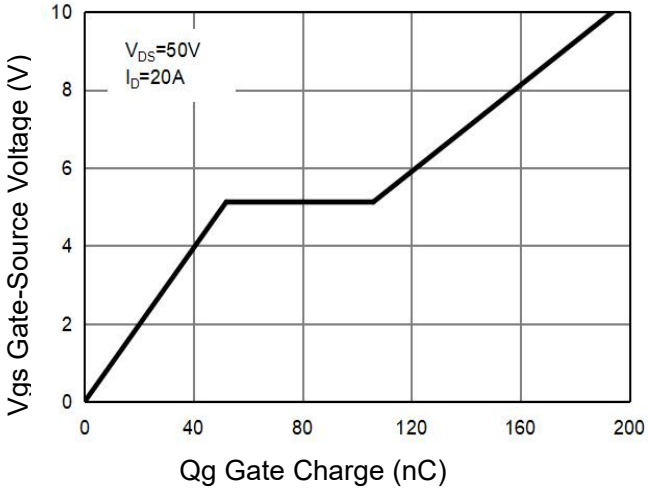


Figure 5 Gate Charge

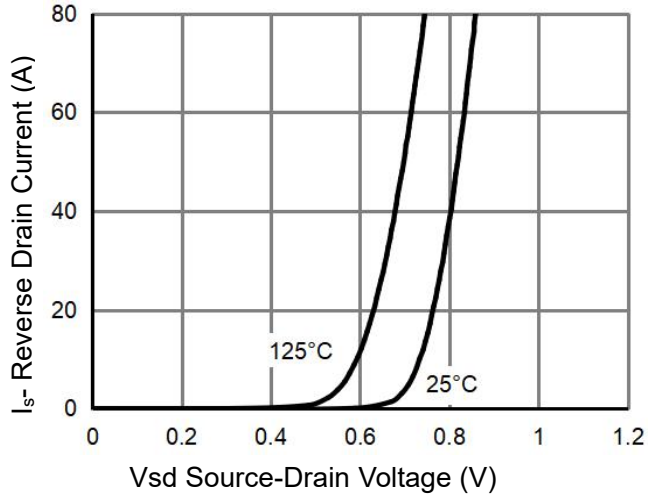


Figure 6 Source- Drain Diode Forward

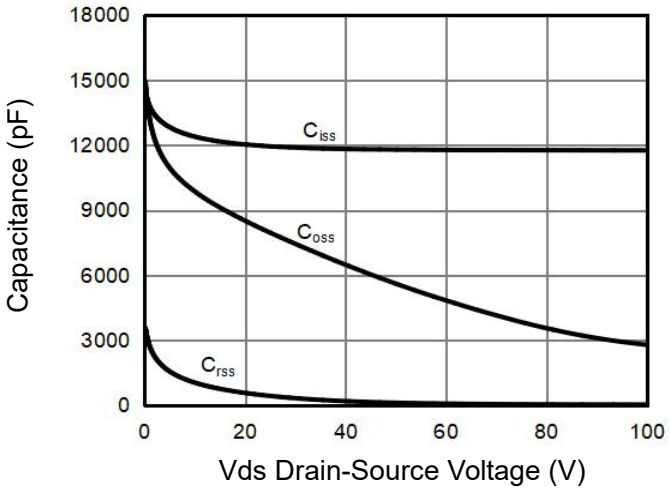


Figure 7 Capacitance vs Vds

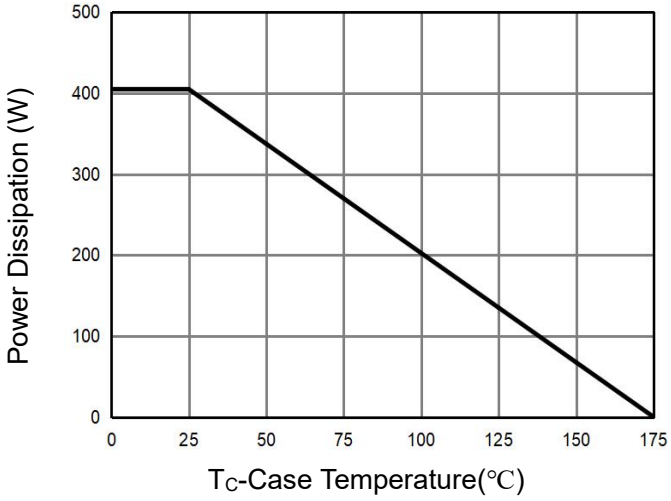


Figure 9 Power De-rating

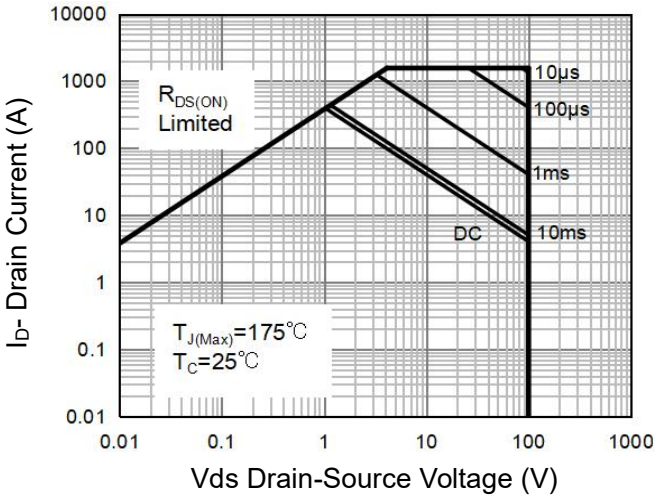


Figure 8 Safe Operation Area (Note3)

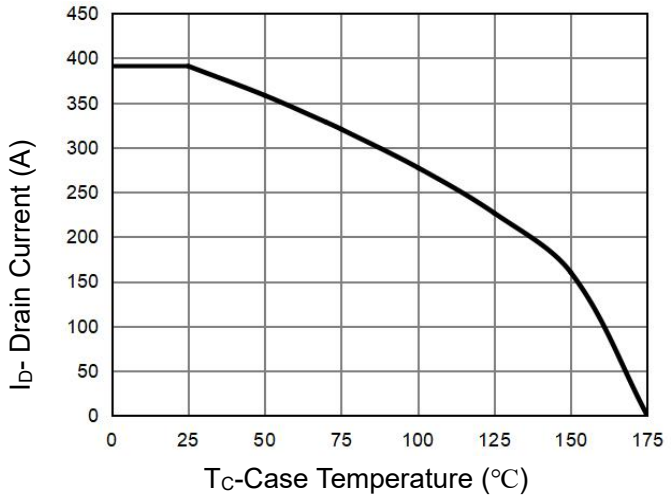


Figure 10 Current De-rating

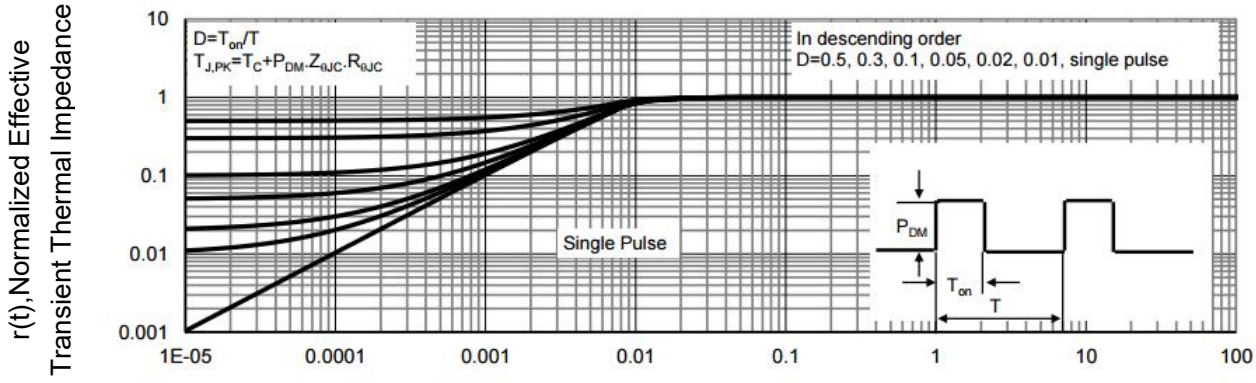
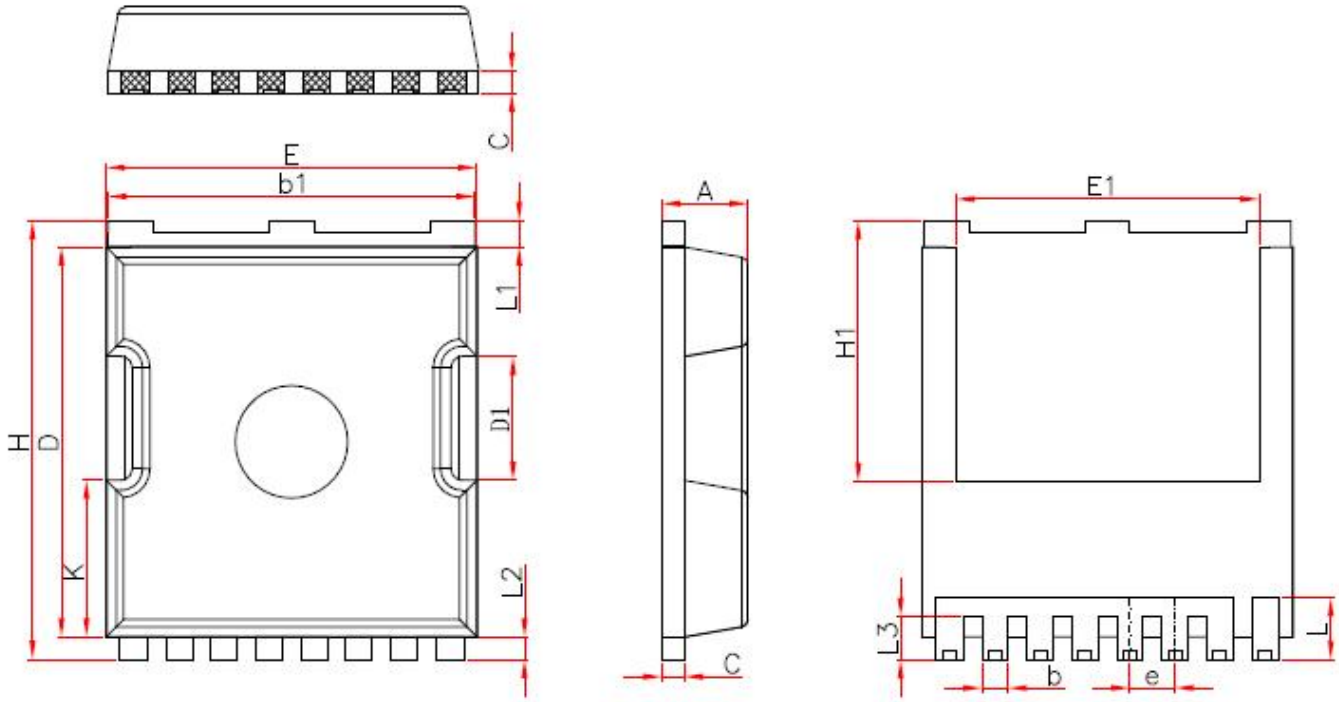


Figure 11 Normalized Maximum Transient Thermal Impedance

TOLL Package Information



Symbol	Millimeters		
	Min.	Nom.	Max.
A	2.20	2.30	2.40
b	0.65	0.75	0.85
b1	9.70	9.80	9.90
C	0.50	0.60	0.70
D	10.30	10.40	10.50
D1	3.15	3.3	3.45
E	9.70	9.90	10.10
E1	8.00	8.10	8.20
e	1.10	1.20	1.30
H	11.6	11.7	11.8
H1	6.85	6.95	7.05
K	4.08	4.18	4.28
L	1.60	1.65	2.10
L1	0.60	0.70	0.80
L2	0.50	0.60	0.70
L3	1.05	1.20	1.30

Revision History

Revision	Date	Subjects
V1.0	2024.01.22	Product data sheet
V2.0	2025.07.18	Correct I_D (T_C=25℃)&I_D (T_C=100℃) Correct Dynamic Characteristics & Switching Characteristics Correct Reverse Recovery Time & Reverse Recovery Charge Correct Figure 4 Rdson-Junction Correct Figure 8 Safe Operation Area
V3.0	2025.09.16	Update RDON MAX Update ID & Figure 8 & Figure 10
V3.1	2025.12.30	Add Rg Typ

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