

Description:

This N+P Channel MOSFET uses advanced trench technology and design to provide excellent $R_{DS(on)}$ with low gate charge.

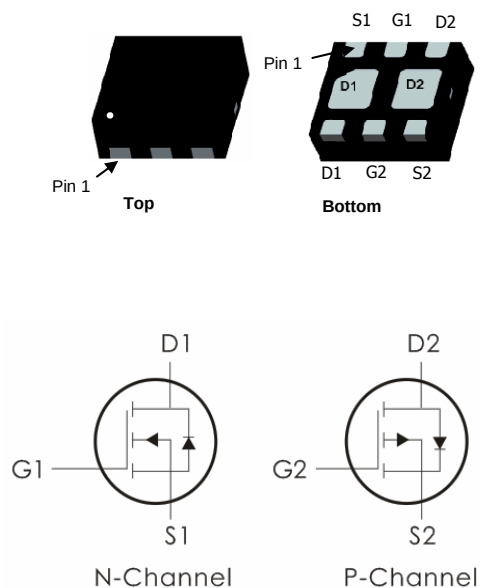
It can be used in a wide variety of applications.

Features:

N-Channel: $V_{DS}=20V, I_D=5.4A, R_{DS(on)} < 26m\Omega @ V_{GS}=4.5V$ (Typ: $21m\Omega$)

P-Channel: $V_{DS}=-20V, I_D=-4A, R_{DS(on)} < 35m\Omega @ V_{GS}=-4.5V$ (Typ: $27m\Omega$)

- 1) Low gate charge.
- 2) Green device available.
- 3) Advanced high cell density trench technology for ultra low $R_{DS(on)}$.
- 4) Excellent package for good heat dissipation.
- 5) MSL3



Package Marking and Ordering Information:

Part NO.	Marking	Package	Packing
RB519NPG	B519NP	DFN2*2-6	3000 pcs/Reel

Absolute Maximum Ratings: ($T_A=25^\circ C$ unless otherwise noted)

Symbol	Parameter	N-Channel	P-Channel	Units
V_{DS}	Drain-Source Voltage	20	-20	V
V_{GS}	Gate-Source Voltage	± 12	± 12	V
I_D	Continuous Drain Current- $T_A=25^\circ C^1$	5.4	-4	A
	Continuous Drain Current- $T_A=100^\circ C^1$	3.7	-2.8	
I_{DM}	Pulsed Drain Current ²	21.6	-16	A
P_D	Power Dissipation	1.5	1.5	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150		$^\circ C$

Thermal Characteristics:

Symbol	Parameter	N-CH	P-CH	Units
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	85	85	$^\circ C/W$

N-Channel Electrical Characteristics: ($T_A=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250 μ A	20	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _{DS} =20V	---	---	1	μ A
I _{GSS}	Gate-Source Leakage Current	V _{GS} =± 12V, V _{DS} =0A	---	---	± 100	nA
On Characteristics						
V _{GS(th)}	Gate-Source Threshold Voltage	V _{GS} =V _{DS} , I _D =250 μ A	0.4	0.6	1	V
R _{DS(on)}	Drain-Source On Resistance ⁴	V _{GS} =4.5V, I _D =4A	---	21	26	m Ω
		V _{GS} =2.5V, I _D =3A	---	29	40	m Ω
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, f=1MHz	---	300	---	pF
C _{oss}	Output Capacitance		---	111	---	
C _{rss}	Reverse Transfer Capacitance		---	61.9	---	
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DS} =10V, I _D =4A, R _{ENG} =3 Ω ,V _{GS} =4.5V	---	13	---	ns
t _r	Rise Time		---	57.7	---	ns
t _{d(off)}	Turn-Off Delay Time		---	18	---	ns
t _f	Fall Time		---	10	---	ns
Q _g	Total Gate Charge	V _{GS} =4.5V, V _{DS} =10V, I _D =4A	---	4	---	nC
Q _{gs}	Gate-Source Charge		---	0.9	---	nC
Q _{gd}	Gate-Drain “Miller” Charge		---	1.4	---	nC
Drain-Source Diode Characteristics						
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _{SD} =4A	---	---	1.2	V
I _S	Continuous Drain Current	V _D =V _G =0V	---	---	5.4	A
I _{SM}	Pulsed Drain Current		---	---	21.6	A

Notes:

1. Computed continuous current assumes the condition of $T_{j,Max}$ while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

N-Typical Characteristics: ($T_A=25^\circ C$ unless otherwise noted)

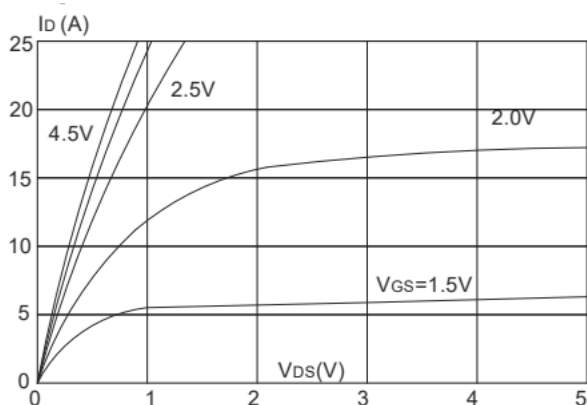


Figure 1: Output Characteristics

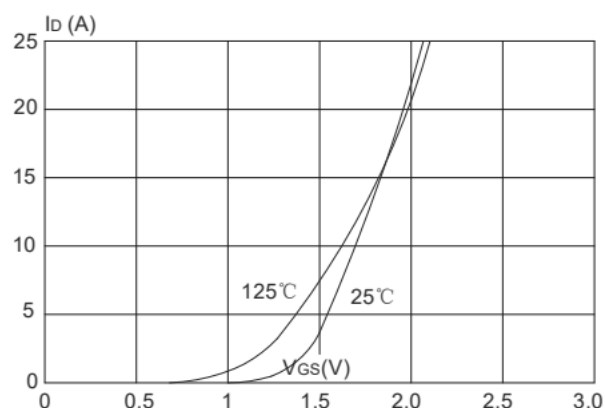


Figure 2: Typical Transfer Characteristics

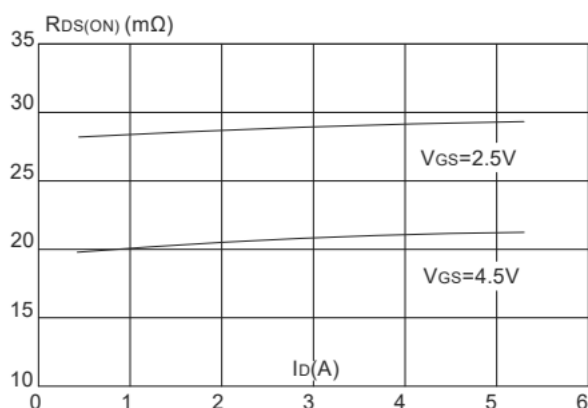


Figure 3: On-resistance vs. Drain Current

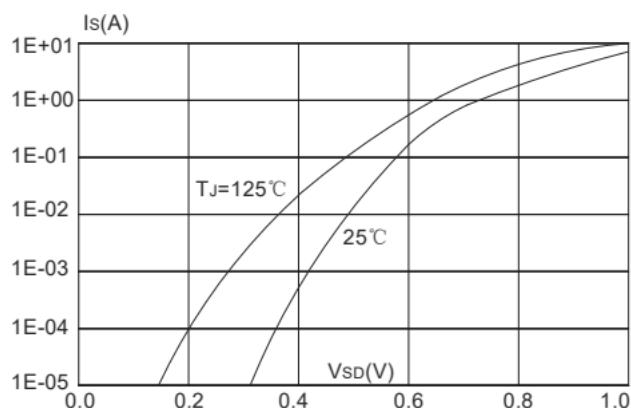


Figure 4: Body Diode Characteristics

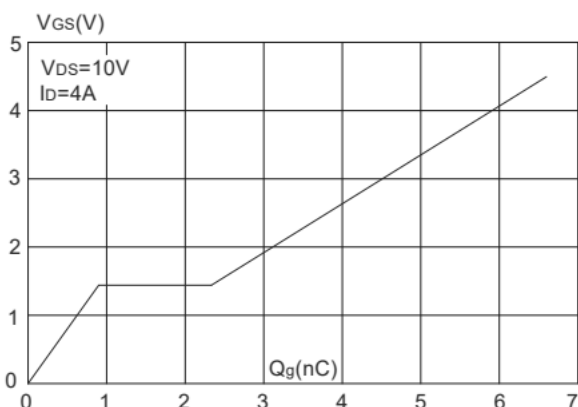


Figure 5: Gate Charge Characteristics

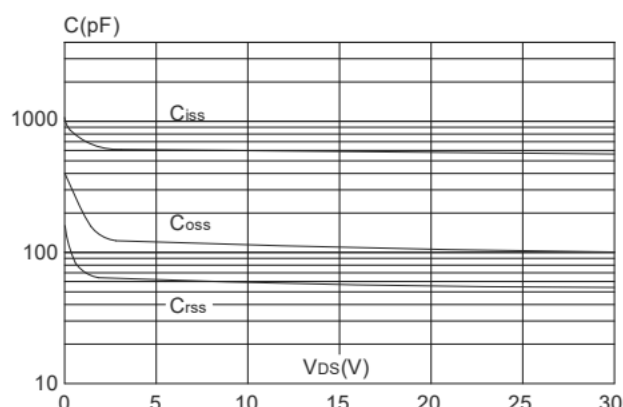


Figure 6: Capacitance Characteristics

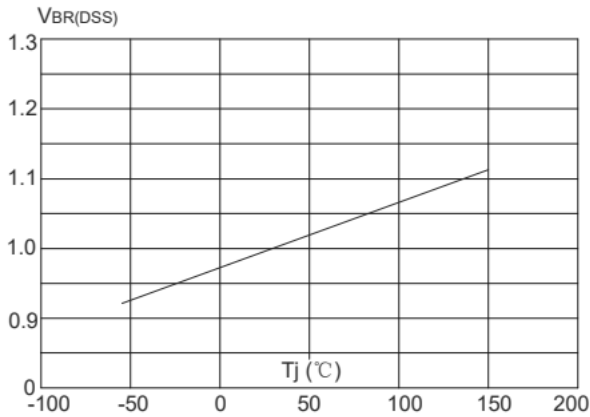


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

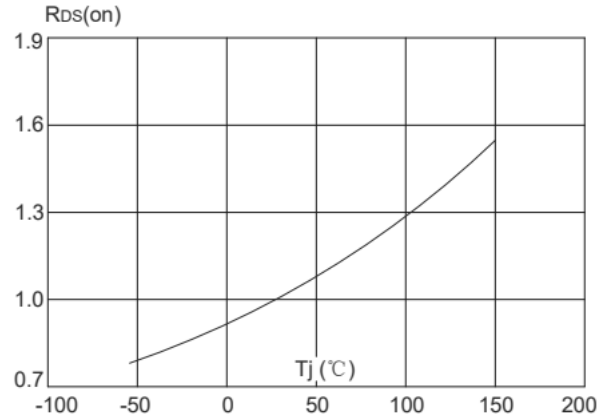


Figure 8: Normalized on Resistance vs. Junction Temperature

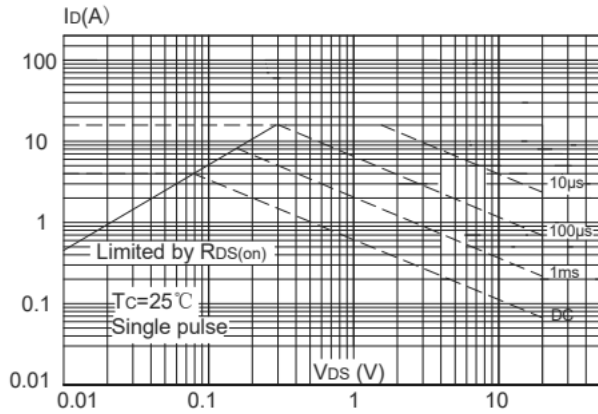


Figure 9: Maximum Safe Operating Area

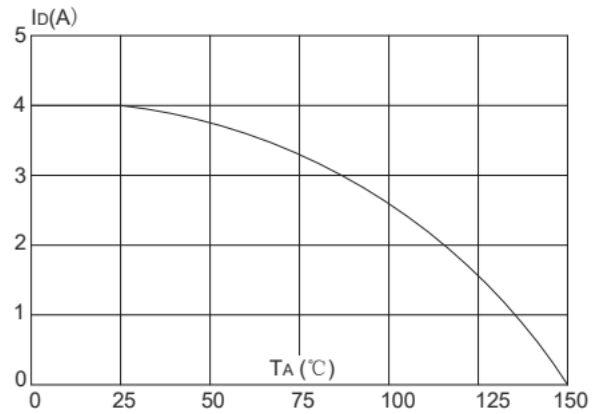


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

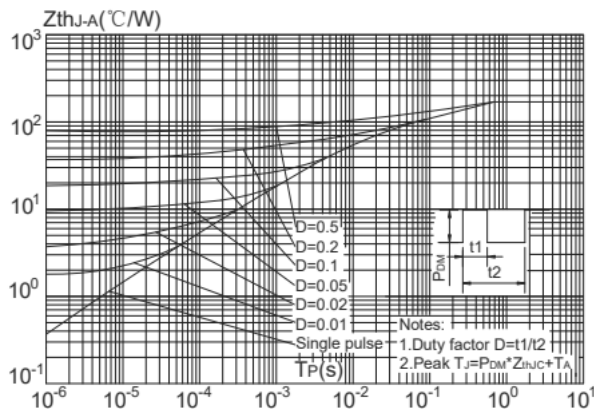


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

P-Channel Electrical Characteristics: ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250 μ A	-20	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _{DS} =-20V	---	---	-1	μ A
I _{GSS}	Gate-Source Leakage Current	V _{GS} =± 12V, V _{DS} =0A	---	---	± 100	nA
On Characteristics						
V _{GS(th)}	Gate-Source Threshold Voltage	V _{GS} =V _{DS} , I _D =250 μ A	-0.4	-0.6	-1	V
R _{DS(ON)}	Drain-Source On Resistance ⁴	V _{GS} =-4.5V, I _D =-4.1A	---	27	35	m Ω
		V _{GS} =-2.5V, I _D =-3A	---	38	50	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =-10V, V _{GS} =0V, f=1MHz	---	450	---	pF
C _{oss}	Output Capacitance		---	138.6	---	
C _{rss}	Reverse Transfer Capacitance		---	89	---	
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} = -10V, I _D =-3.3A V _{GS} = -4.5V, R _{GEN} =1 Ω	---	10.5	---	ns
t _r	Rise Time		---	33	---	ns
t _{d(off)}	Turn-Off Delay Time		---	52	---	ns
t _f	Fall Time		---	53.5	---	ns
Q _g	Total Gate Charge	V _{GS} =-4.5V, V _{DS} =-10V, I _D =-2A	---	6.3	---	nC
Q _{gs}	Gate-Source Charge		---	1.4	---	nC
Q _{gd}	Gate-Drain “Miller” Charge		---	1.9	---	nC
Drain-Source Diode Characteristics						
I _S	Continuous Drain to Source Diode	V _D =V _G =0V	---	---	-4	A
I _{SM}	Pulsed Drain to Source Diode		---	---	-16	---
V _{SD}	Source-Drain Diode Forward Voltage	V _{GS} =0V, I _S =-4.1A	---	---	-1.2	V

Notes:

1. Computed continuous current assumes the condition of $T_{j,Max}$ while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

P-Typical Characteristics: ($T_A=25^\circ C$ unless otherwise noted)

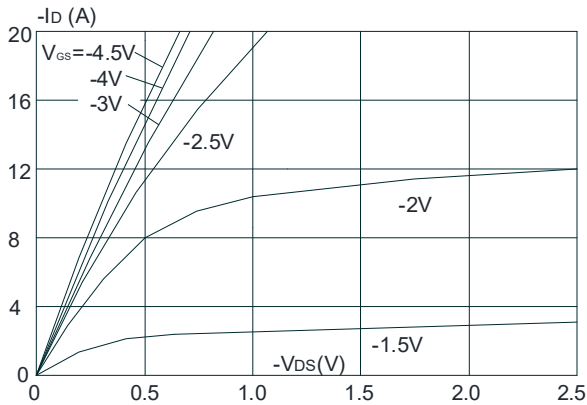


Figure 1: Output Characteristics

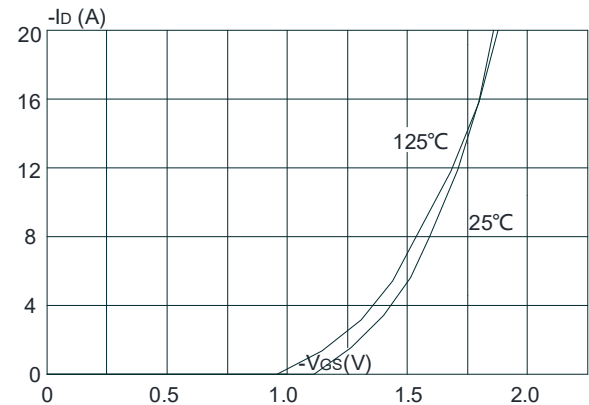


Figure 2: Typical Transfer Characteristics

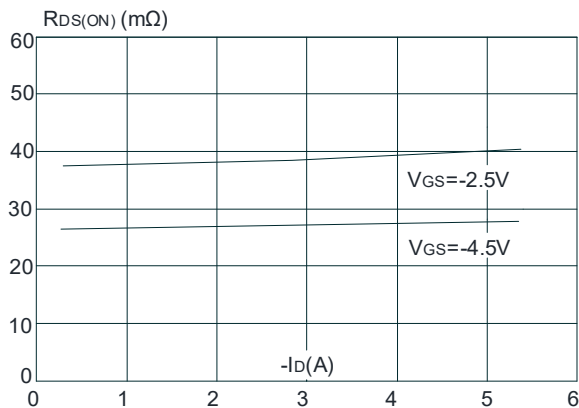


Figure 3: On-resistance vs. Drain Current

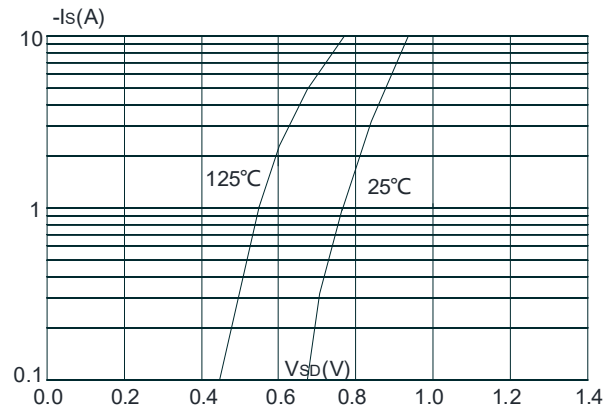


Figure 4: Body Diode Characteristics

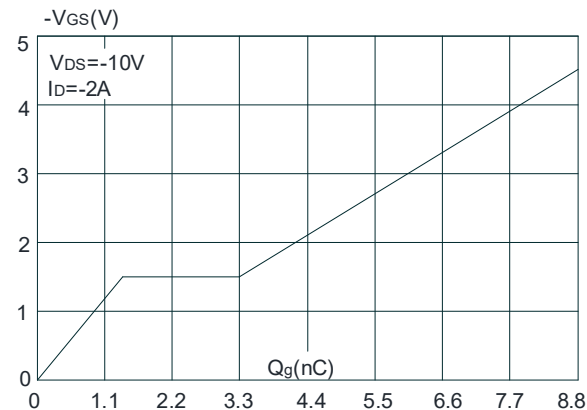


Figure 5: Gate Charge Characteristics

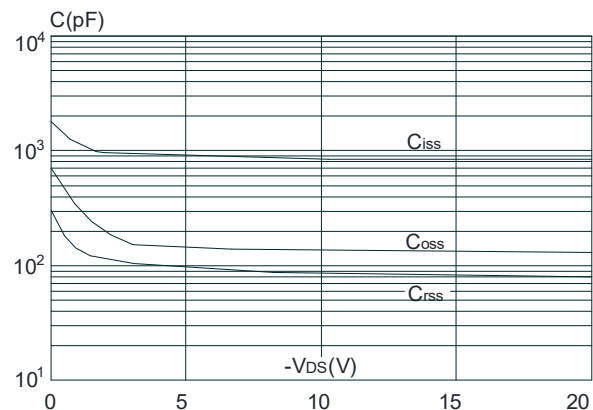


Figure 6: Capacitance Characteristics

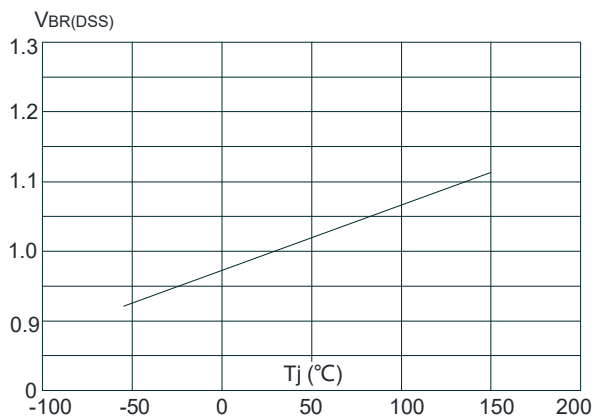


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

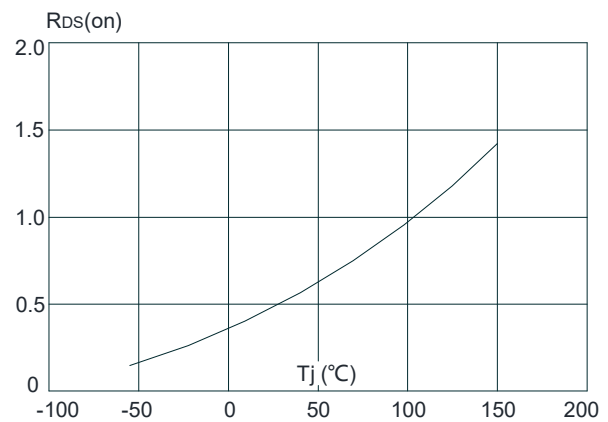


Figure 8: Normalized on Resistance vs. Junction Temperature

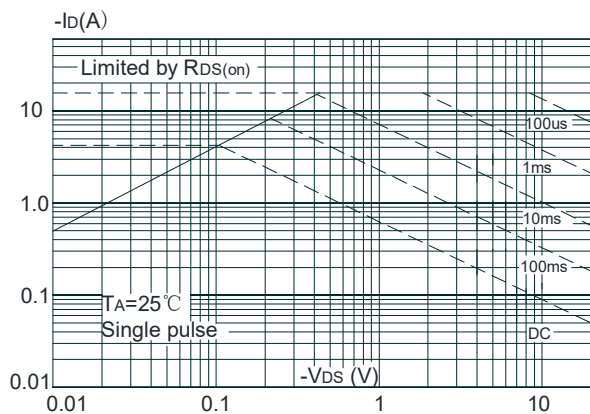


Figure 9: Maximum Safe Operating Area

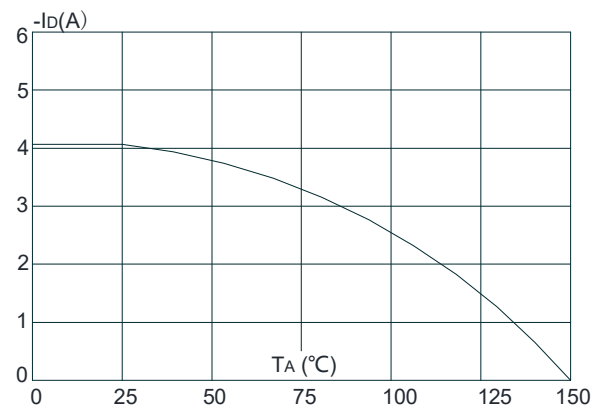


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

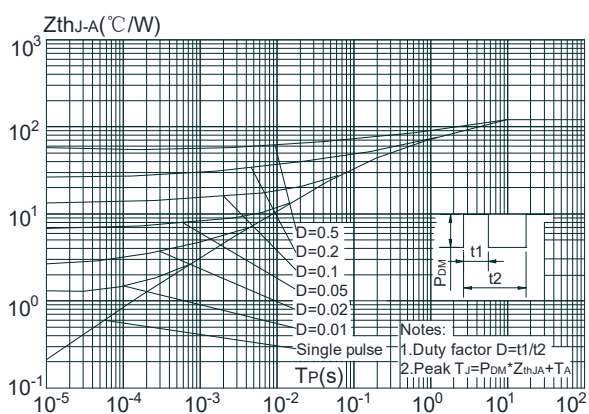
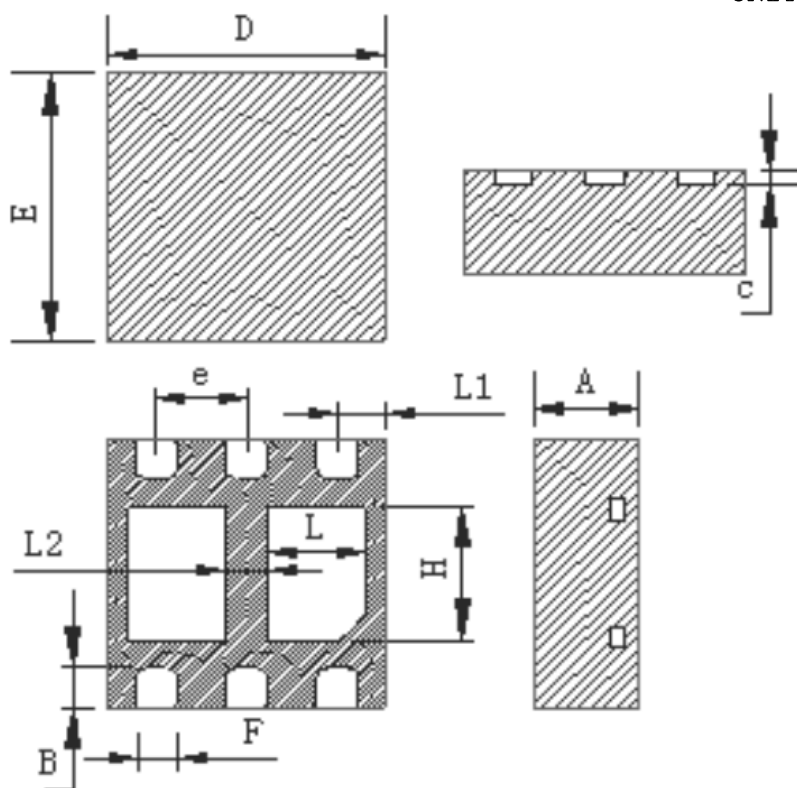


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

DFN2X2-6D Package Outline Data

UNIT: mm



Symbol	Min	Typ	Max
A	0.68	0.75	0.80
B	0.20	0.30	0.40
C		0.203	
D	1.90	2.00	2.10
E	1.90	2.00	2.10
e		0.65	
F	0.20	0.30	0.40
H	0.85	1.00	1.10
L	0.55	0.70	0.80
L1	0.25	0.35	0.45
L2	0.20	0.30	0.40

Marking Information:

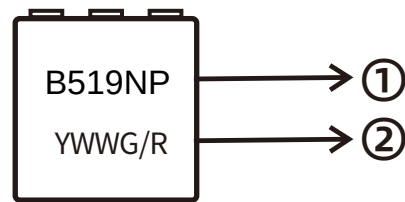
①: Part NO.

②: Date Code (YWWG / R)

Y: Year Code , last digit of the year

WW : Week Code (01-53)

G/R: G(Green) /R(Lead Free)



Previous Version

Version	Date	Subjects (major changes since last revision)
1.0	2025-06-20	Release of final version

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