WANSEMI
万代半导体

WP4024

Enhancement Mode N+P-Channel Power MOSFET

TO-252-4L/N+PMOS/40V/±20V/1.65V/25A/18mΩ

-40V/±20V/-1.75V/-20A/30mΩ

Rev1.0

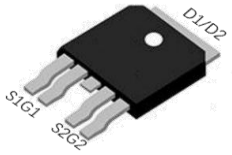
40V N+P-Channel Enhancement Mode MOSFET

1.Features

- High power and current handing capability
- Lead free product is acquired
- Fast switching
- Surface mount package
- 100% RG Tested
- 100% UIS Tested

2.Applications

- BLDC Motor driver
- PWM applications



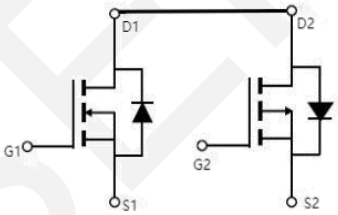
TO-252-4L
Pin Description

- N-Channel

V_{DS}	$R_{DS(on)}$ Typ.	I_D Max.
40V	18mΩ @ 10V	25A
	23mΩ @ 4.5V	

- P-Channel

V_{DS}	$R_{DS(on)}$ Typ.	I_D Max.
-40V	30mΩ @ 10V	-20A
	38mΩ @ 4.5V	



N-Channel P-Channel
Schematic Diagram

3.Package Marking and Ordering Information

Part no.	Marking	Package	PCS/Reel	PCS/CTN.
WP4024	4024	TO-252-4L	2,500	25,000

4.Absolute Max Ratings at Ta=25℃ (Note1)

Parameter	Symbol	N-chanel	P-chanel	Units
Drain to Source Voltage	V_{DS}	40	-40	V
Gate to Source Voltage	V_{GS}	±20	±20	V
Drain Current (DC)	I_D	25	-20	A
Drain Current (Pulse), PW≤300μs	I_{DP}	100	-80	A
Avalanche Energy, Single Pulsed	E_{AS}	36	56	mJ
Total Dissipation	P_D	14		W
Junction Temperature	T_j	150		℃
Storage Temperature	T_{stg}	-55 to +150		℃

Note 1: Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

5.Thermal Resistance Ratings

Parameter	Symbol	Value	Unit
Junction to ambient	$R_{\theta JA}$	64	℃/W

Note 2：When mounted on 1 inch square copper board t ≤ 10sec The value in any given application depends on the user's specific board design.

6.Electrical Characteristics at Ta=25℃ (Note 3)

N-Channel

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	I_D = 250μA, V_{GS} = 0V	40	-	-	V
Zero-Gate Voltage Drain Current	I_{DSS}	V_{DS} = 40V， V_{GS} = 0V	-	-	1	μA
Gate to Source Leakage Current	I_{GSS}	V_{GS} = ±20V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_{DS}=250μA	1.2	1.65	2.5	V
Static Drain to Source On-State Resistance	$R_{DS(on)}$	I_D = 15A, V_{GS} = 10V	-	18	23	mΩ
		I_D = 10A, V_{GS} = 4.5V	-	23	32	mΩ
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=20V, Frequency=1.0MHz	-	850	-	pF
Output Capacitance	C_{oss}		-	145	-	pF
Reverse Transfer Capacitance	C_{rss}		-	108	-	pF
Turn-ON Delay Time	$t_{d(on)}$	V_{DD}=20V, R_G= 3Ω, V_{GS} =10V, I_D = 5A,	-	6	-	ns
Rise Time	t_r		-	6	-	ns
Turn-OFF Delay Time	$t_{d(off)}$		-	24	-	ns
Fall Time	t_f		-	3	-	ns
Total Gate Charge	Q_g	V_{DS} = 20V, V_{GS} =0 to 10V, I_D = 5A	-	23	-	nC
	Q_{gs}		-	3.5	-	nC
	Q_{gd}		-	4	-	nC
Diode Forward Voltage	V_{FSD}	I_{SD} = 15A, V_{GS} =0V	0.5	-	1.2	V

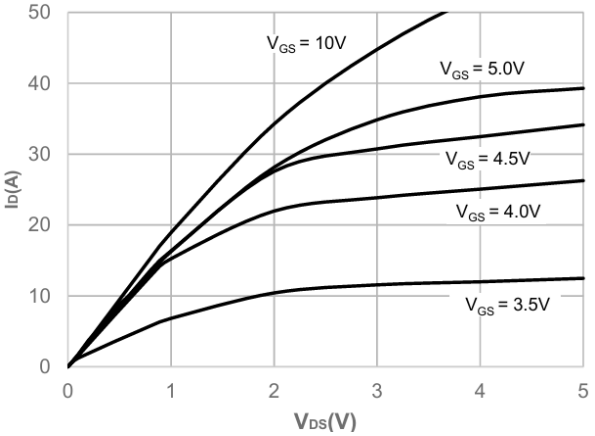
Note 3：Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

P-Channel

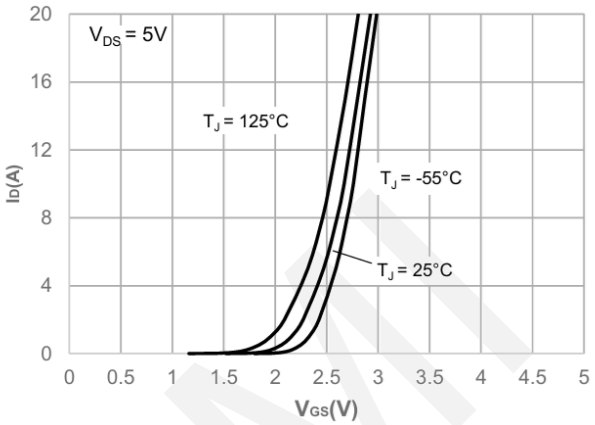
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	I_D = -250μA, V_{GS} = 0V	-40	-	-	V
Zero-Gate Voltage Drain Current	I_{DSS}	V_{DS} = -40V， V_{GS} = 0V	-	-	-1	μA
Gate to Source Leakage Current	I_{GSS}	V_{GS} = ±20V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_{DS}=-250μA	-1.2	-1.75	-2.3	V
Static Drain to Source On-State Resistance	$R_{DS(on)}$	I_D = -15A, V_{GS} = -10V	-	30	40	mΩ
		I_D = -10A, V_{GS} = -4.5V	-	38	50	mΩ
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=-20V, Frequency=1.0MHz	-	1171	-	pF
Output Capacitance	C_{oss}		-	165	-	pF
Reverse Transfer Capacitance	C_{rss}		-	129	-	pF
Turn-ON Delay Time	$t_{d(on)}$	V_{DD}=-20V, R_G= 3Ω, V_{GS} =-10V, I_D = -5A,	-	5	-	ns
Rise Time	t_r		-	2	-	ns
Turn-OFF Delay Time	$t_{d(off)}$		-	54	-	ns
Fall Time	t_f		-	25	-	ns
Total Gate Charge	Q_g	V_{DS} = -20V, V_{GS} = 0 to -10V, I_D = -5A	-	22	-	nC
	Q_{gs}		-	4	-	nC
	Q_{gd}		-	4	-	nC
Diode Forward Voltage	V_{FSD}	I_{SD} = -15A, V_{GS} =0V	-0.5	-	-1.2	V

7.Typical electrical and thermal characteristics

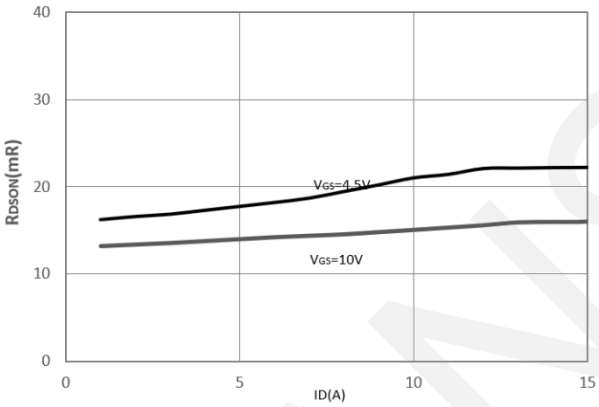
N-Channel



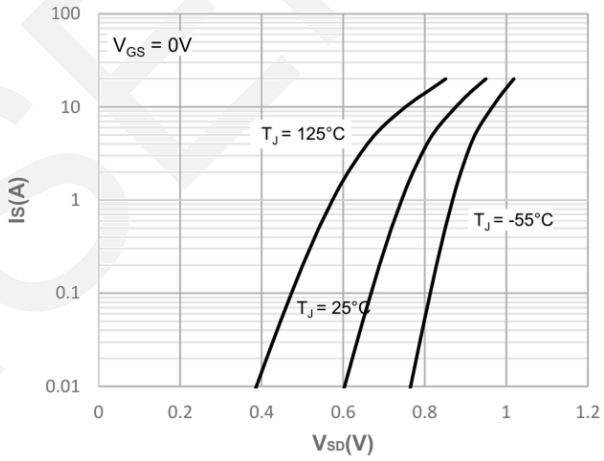
Output Characteristics



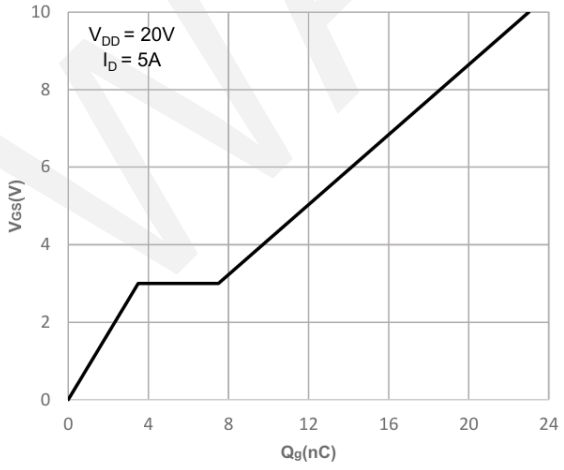
Transfer Characteristics



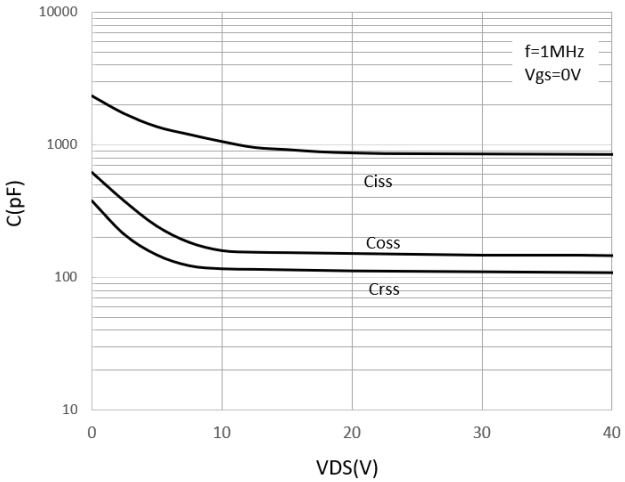
On-Resistance vs. Drain Current and Gate



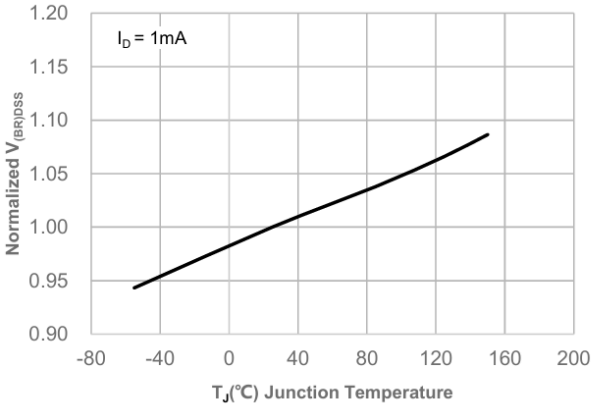
Body Diode Characteristics



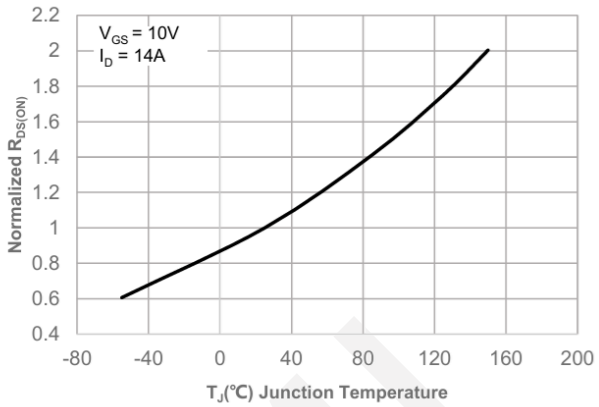
Typical Gate Charge Vs. Gate-Source Voltage



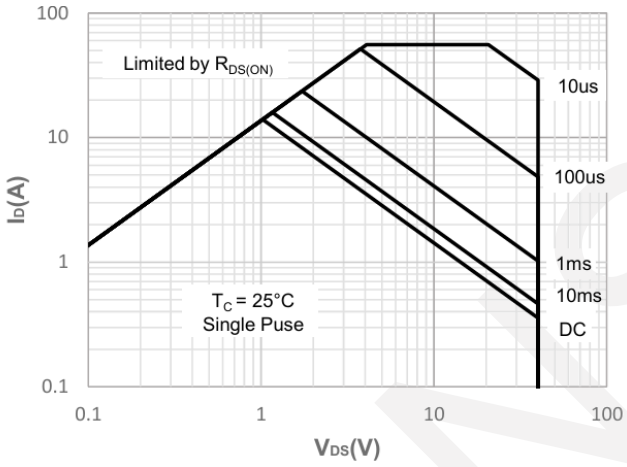
Capacitance Characteristics



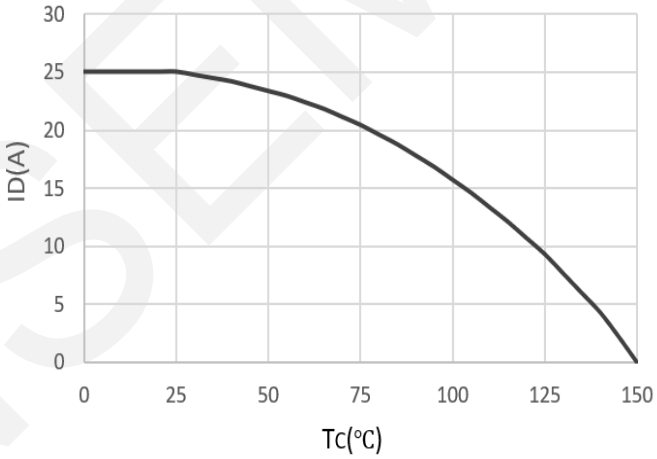
Normalized Breakdown Voltage vs . Junction Temperature



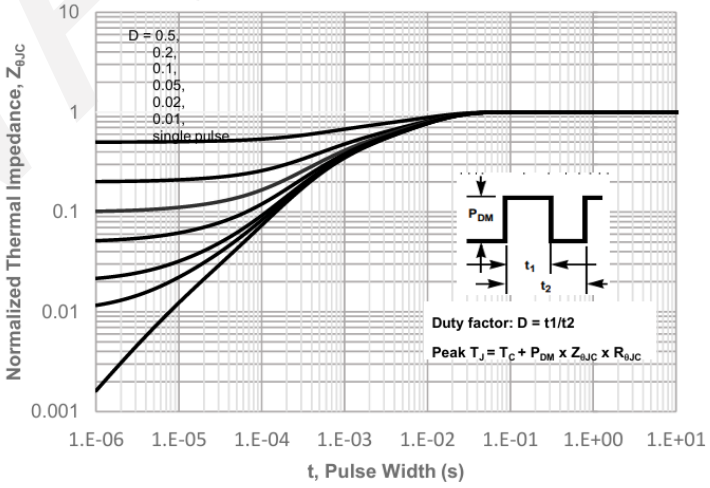
Normalized on Resistance vs . Junction Temperature



Maximum Safe Operating Area

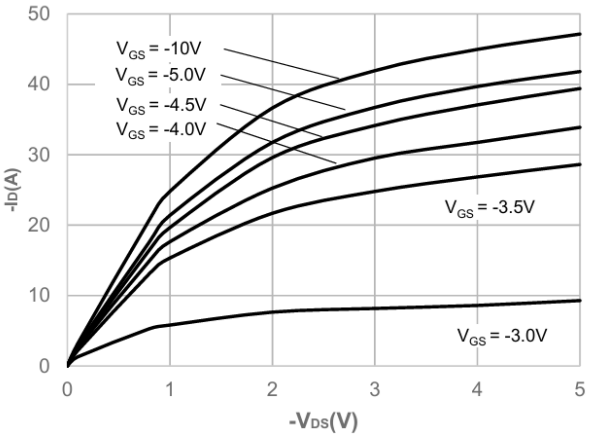


Maximum Continuous Drain Current vs. Case Temperature

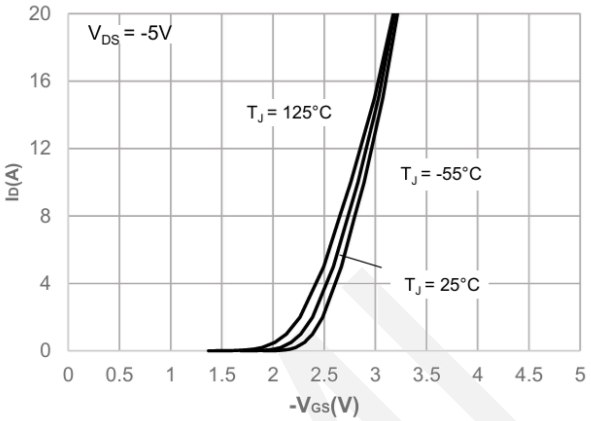


Maximum Continuous Drain Current vs. Case Temperature

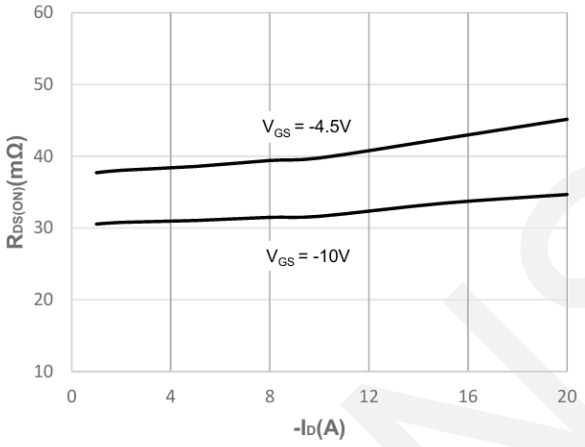
P-Channel



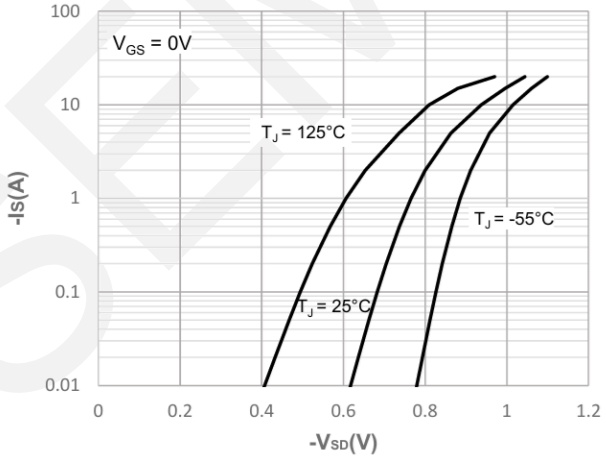
Output Characteristics



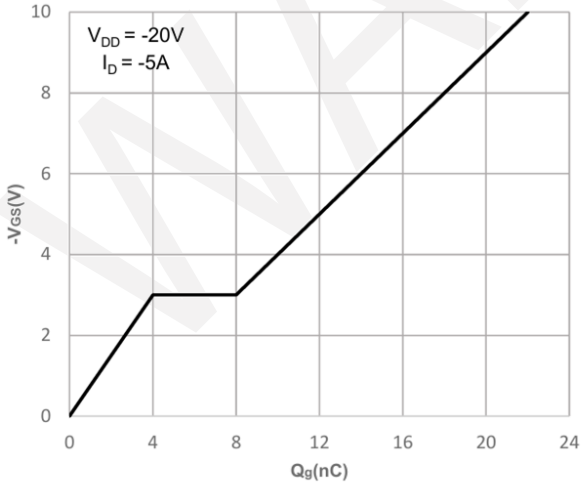
Transfer Characteristics



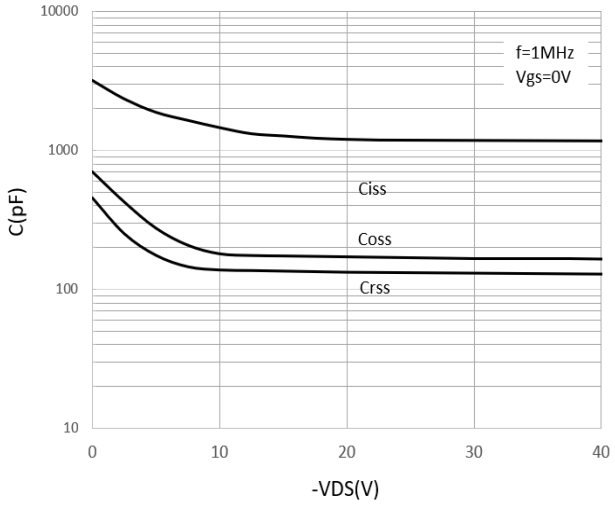
On-Resistance vs. Drain Current and Gate



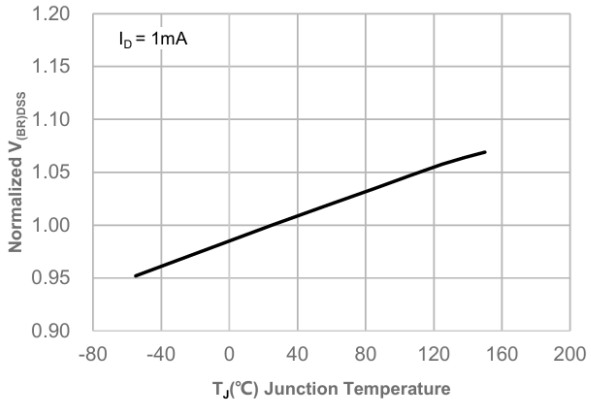
Body Diode Characteristics



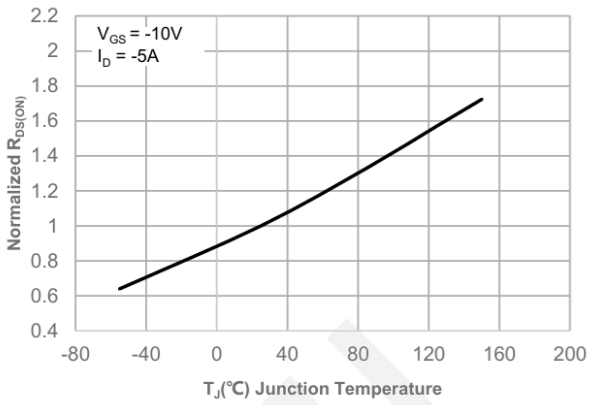
Typical Gate Charge Vs. Gate-Source Voltage



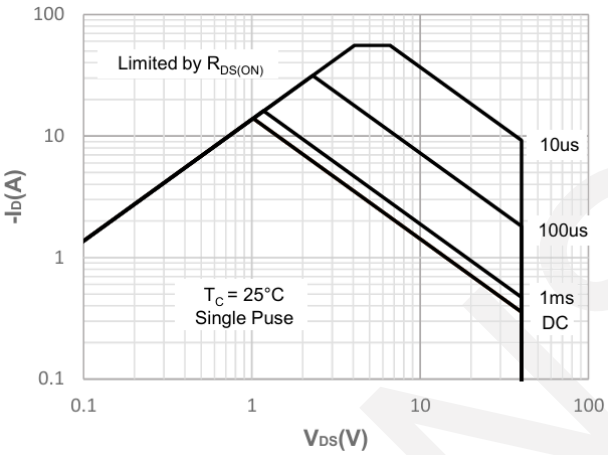
Capacitance Characteristics



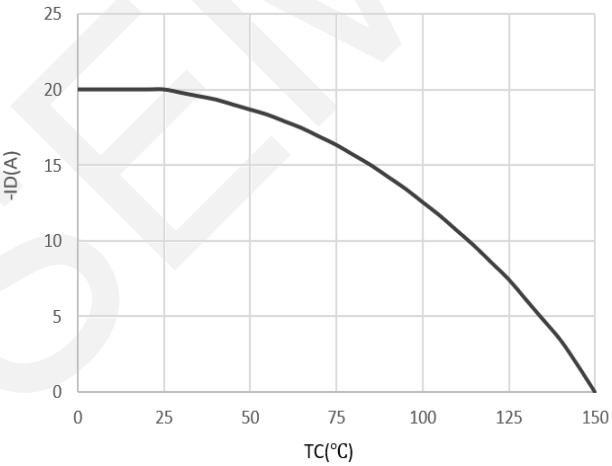
Normalized Breakdown Voltage vs . Junction Temperature



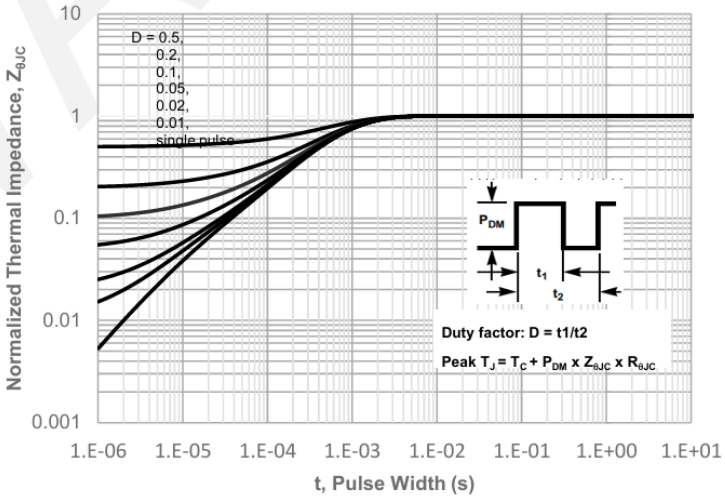
Normalized on Resistance vs . Junction Temperature



Maximum Safe Operating Area

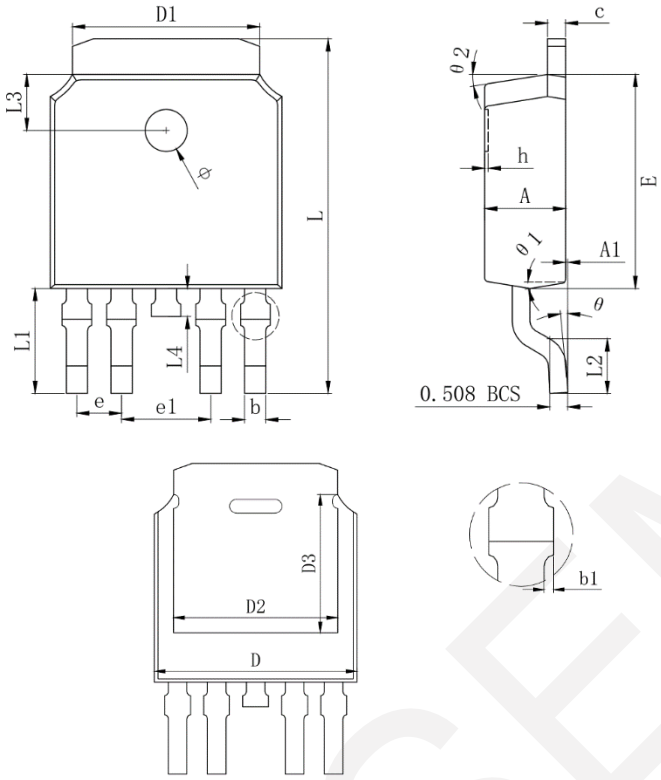


Maximum Continuous Drain Current vs. Case Temperature



Maximum Continuous Drain Current vs. Case Temperature

8.Package Dimensions



SYMBOL	MILLIMETER		
	MIN	Typ.	MAX
A	2.200	2.300	2.400
A1	0.000		0.127
b	0.550	0.600	0.650
b1	0.000		0.120
c(电镀后)	0.460	0.520	0.580
D	6.500	6.600	6.700
D1	5.334 REF		
D2	5.346 REF		
D3	4.490 REF		
E	6.000	6.100	6.200
e	1.270 TYP		
e1	2.540 TYP		
h	0.000	0.100	0.200
L	9.900	10.100	10.300
L1	2.988 REF		
L2	1.400	1.550	1.700
L3	1.600 REF		
L4	0.700	0.800	0.900
Φ	1.100	1.200	1.300
θ	0°		8°
θ1	9° TYP		
θ2	9° TYP		

9. Important Notice

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