WANSEMI
万代半导体

WP4010R

Enhancement Mode N+P-Channel Power MOSFET

PDFN5x6/N+PMOS/40V/±20V/1.7V/15A/17mΩ

-40V/±20V/-1.7V/-15A/40mΩ

Rev0.6

40V N+P-Channel MOSFET

1.Features

- High power and current handing capability
- Lead free product is acquired
- Fast switching
- Surface mount package

- N-Channel

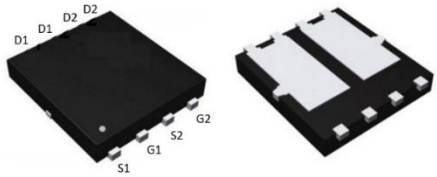
V_{DS}	$R_{DS(on)}$ Typ.	I_D
40V	17mΩ @ 10V	15A
	26mΩ @ 4.5V	

- P-Channel

V_{DS}	$R_{DS(on)}$ Typ.	I_D
-40V	40mΩ @ -10V	-15A
	54mΩ @ -4.5V	

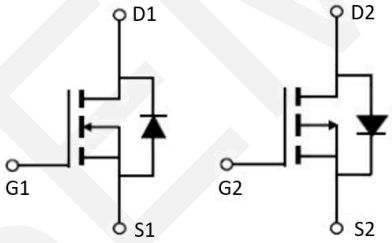
2.Applications

- BLDC Motor driver
- PWM applications



PDFN5x6

Pin Description、



N-Channel P-Channel

Schematic Diagram

3.Package Marking and Ordering Information

Part no.	Marking	Package	PCS/Tube	PCS/CTN.
WP4010R	WP4010R	PDFN5X6	5,000	50,000

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

Parameter	Symbol	N-chanel	P-chanel	Units
Drain to Source Voltage	V_{DSS}	40	-40	V
Gate to Source Voltage	V_{GSS}	±20	±20	V
Drain Current (DC)	I_D	15	-15	A
Drain Current (Pulse), PW≤300μs	I_{DM}	60	-60	A
Total Dissipation	P_D	1.3	2.6	W
Avalanche Energy, Single Pulsed	E_{AS}	30	36	mJ
Junction Temperature	T_j	-55 to +175		℃
Storage Temperature	T_{stg}			

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 (Note 2)

Parameter	Symbol	N-chanel	P-chanel	Unit
Maximum Junction-to-Ambient	$R_{\theta JA}$	32	7	℃/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, V_{DS} = 0V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_{DS}=250μA	1.0	1.7	2.5	V
Static Drain to Source On-State Resistance	$R_{DS(on)}$	I_D = 10A, V_{GS} = 10V	-	17	24	mΩ
		I_D = 5A, V_{GS} = 4.5V	-	26	35	mΩ
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=20V, Frequency=1.0MHz	-	536	-	pF
Output Capacitance	C_{oss}		-	42	-	pF
Reverse Transfer Capacitance	C_{rss}		-	33	-	pF
Turn-ON Delay Time	$t_{d(on)}$	V_{DS} = 20V, I_D = 3A V_{GS} = 10V, R_G = 3Ω	-	4	-	ns
Rise Time	t_r		-	2	-	ns
Turn-OFF Delay Time	$t_{d(off)}$		-	15	-	ns
Fall Time	t_f		-	2	-	ns
Total Gate Charge	Q_g	V_{DS} = 20V, V_{GS} =10V, I_D = 3A	-	11	-	nC
	Q_{gs}		-	2	-	nC
	Q_{gd}		-	2	-	nC
Diode Forward Voltage	V_{FSD}	I_S =20A, V_{GS} = 0V	-	-	1.2	V

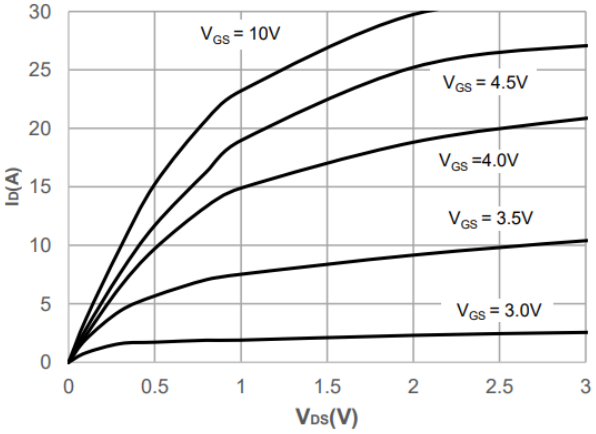
P-Channel

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, V_{DS} = 0V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_{DS}=-250μA	-1.0	-1.7	-2.5	V
Static Drain to Source On-State Resistance	$R_{DS(on)}$	I_D = -10A, V_{GS} = -10V	-	40	53	mΩ
		I_D =-5A, V_{GS} =-4.5V	-	54	77	mΩ
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=-20V, Frequency=1.0MHz	-	900	-	pF
Output Capacitance	C_{oss}		-	80	-	pF
Reverse Transfer Capacitance	C_{rss}		-	60	-	pF
Turn-ON Delay Time	$t_{d(on)}$	V_{DD} = -20V V_{GS} = -10V R_{GEN} =3Ω, R_L=1.5Ω,	-	10.3	-	ns
Rise Time	t_r		-	4.3	-	ns
Turn-OFF Delay Time	$t_{d(off)}$		-	39	-	ns
Fall Time	t_f		-	46.5	-	ns
Total Gate Charge	Q_g	V_{DS} = -20V, V_{GS} = -10V, I_D = -4A	-	17.3	-	nC
	Q_{gs}		-	3.2	-	nC
	Q_{gd}		-	4.3	-	nC
Diode Forward Voltage	V_{FSD}	I_S = -20A, V_{GS} = 0V	-		-1.2	V

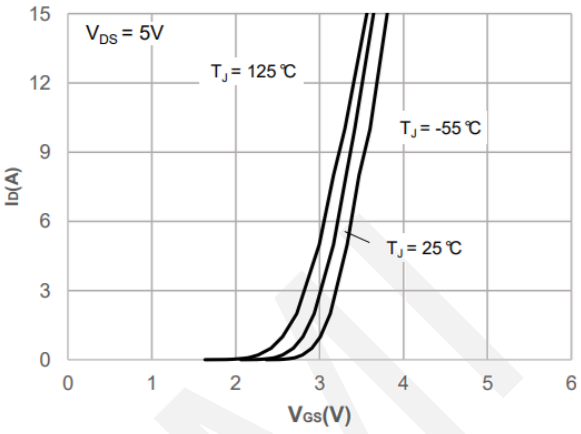
Note 3: Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

7.Typical electrical and thermal characteristics

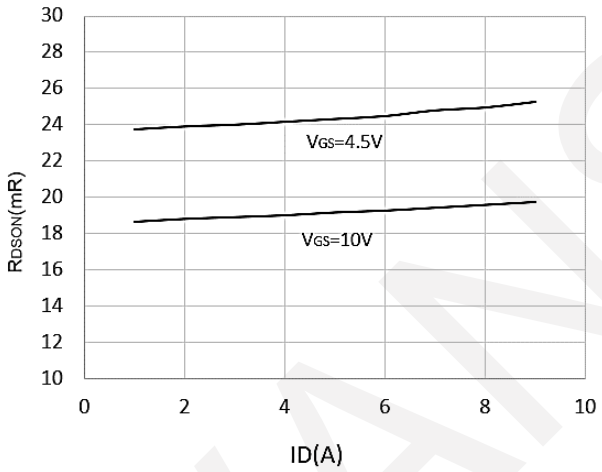
N-Channel



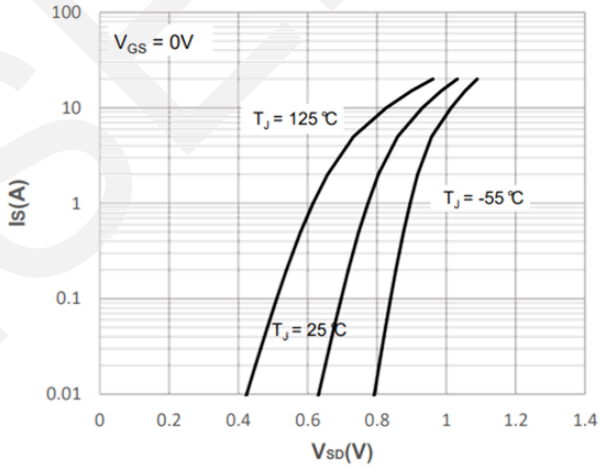
Output Characteristics



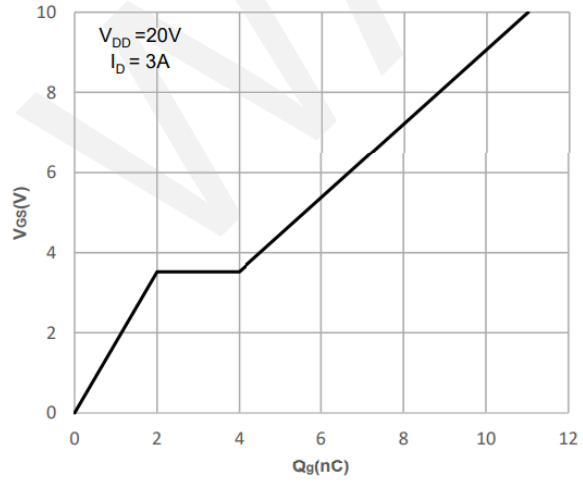
Transfer Characteristics



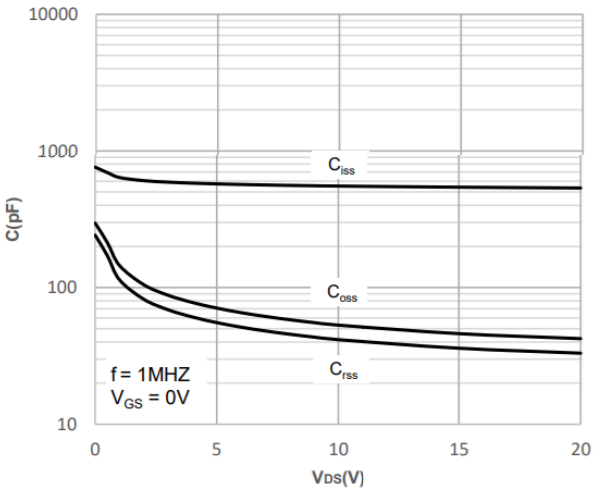
On-resistance vs. Drain Current



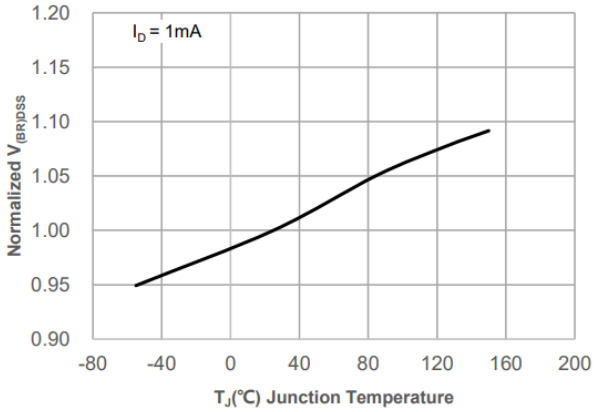
Body Diode Characteristics



Gate Charge Characteristics

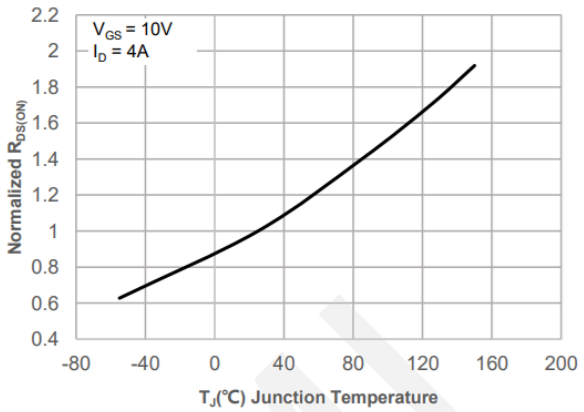


Capacitance Characteristics



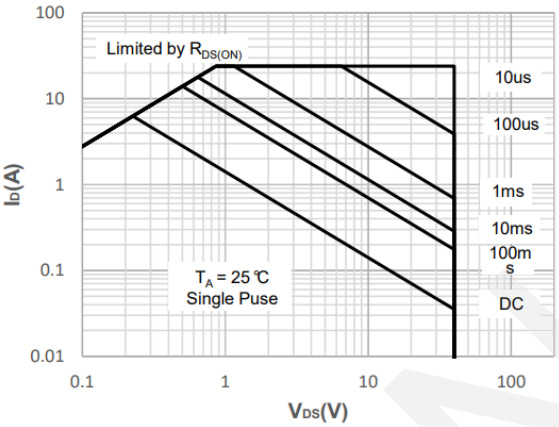
Normalized Breakdown Voltage vs.

Junction Temperature

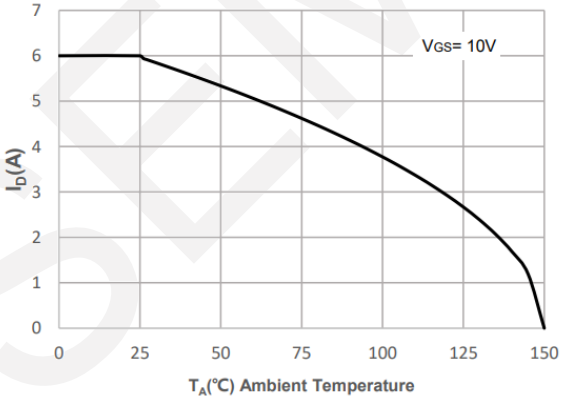


Normalized on Resistance vs.

Junction Temperature

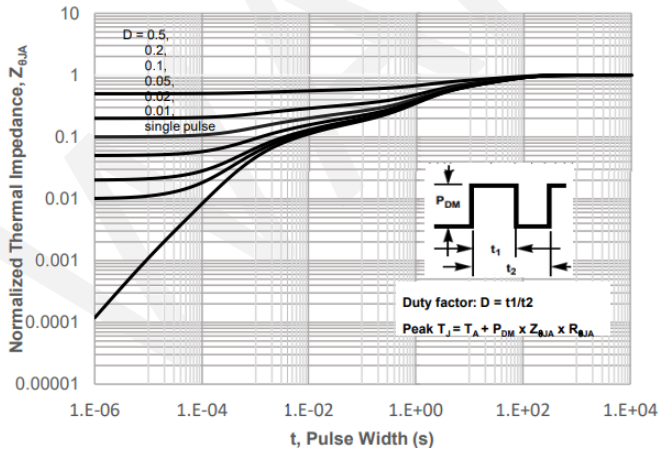


Maximum Safe Operating Area



Maximum Continuous Drain Current vs.

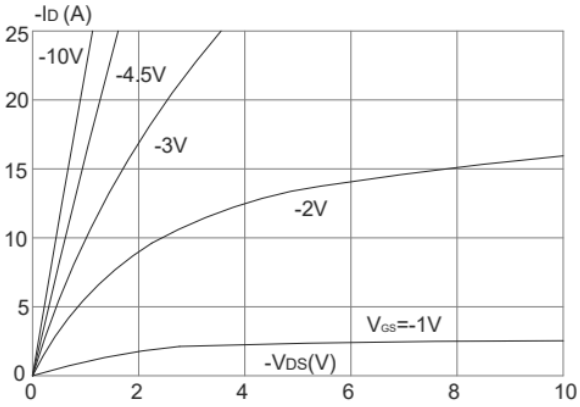
Case Temperature



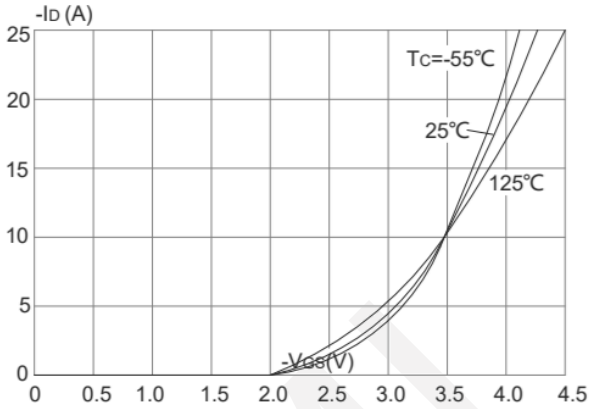
Normalized Maximum Transient

Thermal Impedance

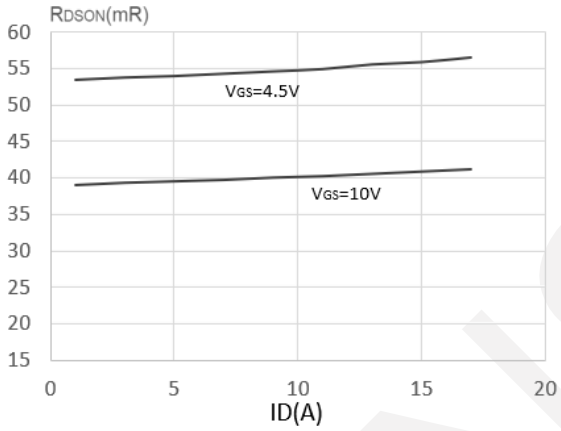
P-Channel



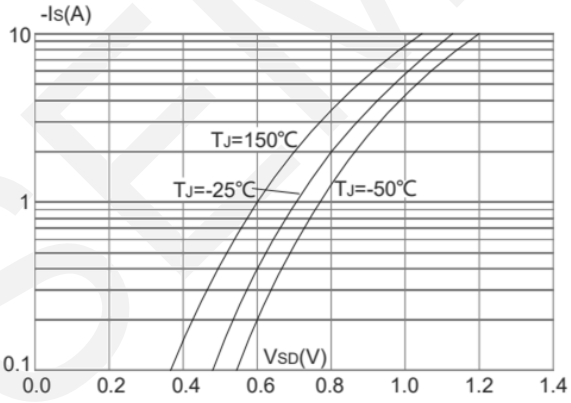
Output Characteristics



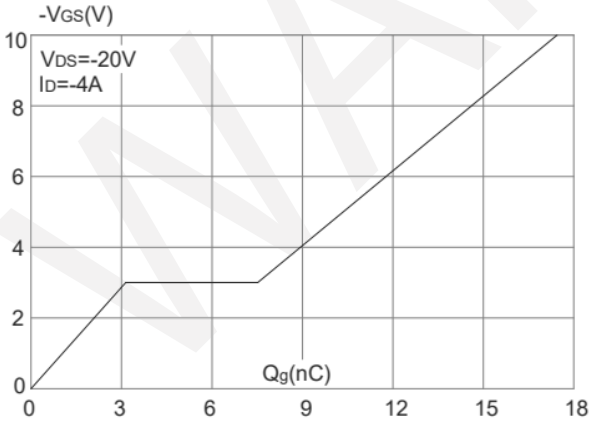
Transfer Characteristics



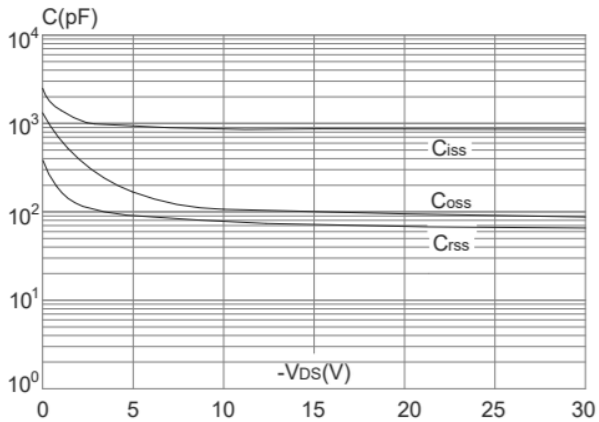
Rdson- Drain Current



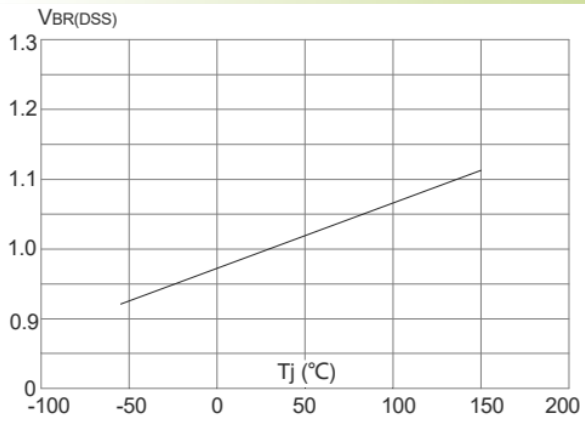
Body Diode Characteristics



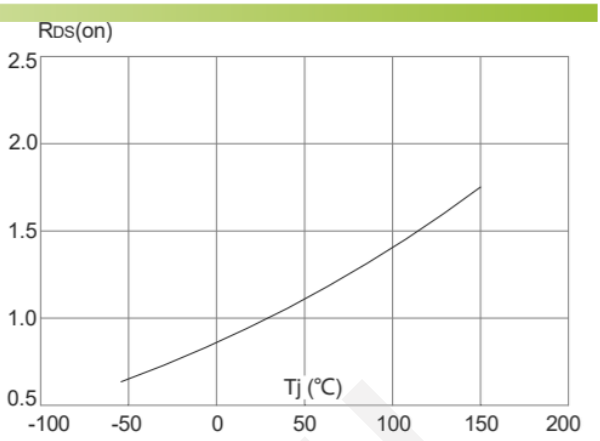
Gate Charge



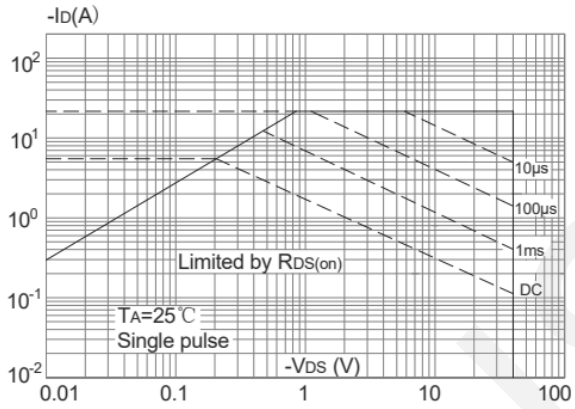
Capacitance Characteristics



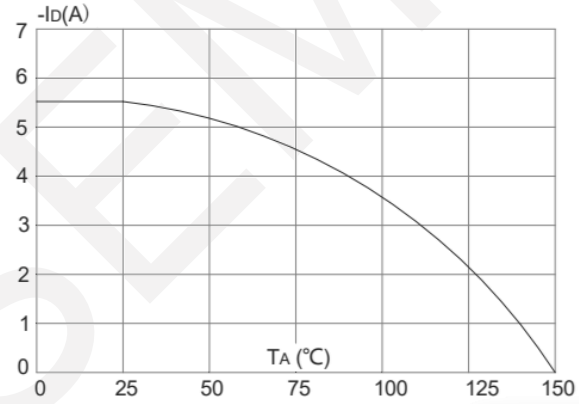
Normalized Breakdown voltage vs. Junction Temperature



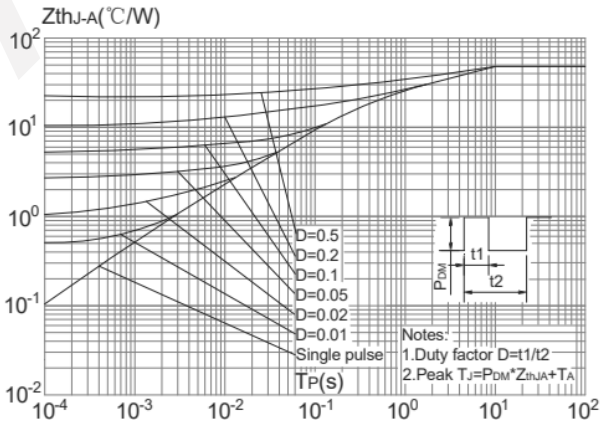
Normalized on Resistance vs. Junction Temperature



Maximum Safe Operating Area

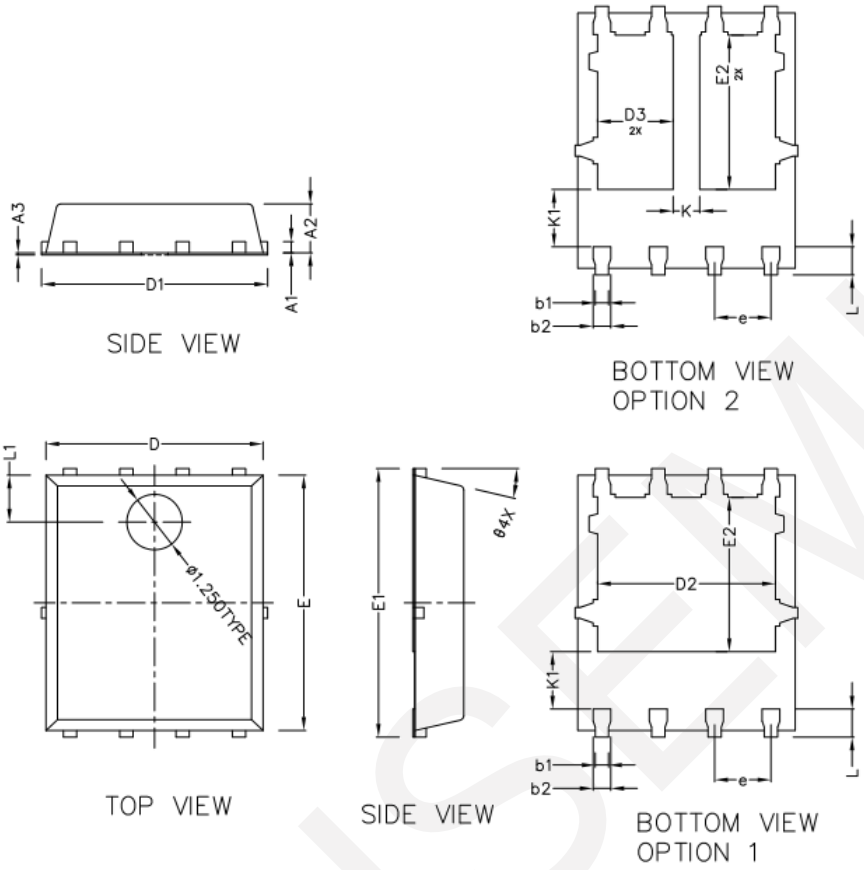


Maximum Continuous Drian Current vs. Case Temperature



Normalized Maximum Transient Thermal Impedance

8.Package Dimensions



COMMON DIMENSIONS (UNITS OF MEASURE IS mm)			
	MIN	NORMAL	MAX
A1		0.254 BSC	
A2	1.000	1.100	1.200
A3	0.005	–	0.020
b1	0.250	0.300	0.350
b2	0.350	0.400	0.450
D	4.800	4.900	5.000
D1	5.000	5.100	5.200
D2	3.910	4.010	4.110
D3	1.605	1.705	1.805
E	5.650	5.750	5.850
E1	5.950	6.050	6.150
E2	3.375	3.475	3.575
e		1.270 TYPE	
L	0.530	0.630	0.730
L1		1.00REF	
θ		13° TYPE	
K		0.600 REF	
K1		1.235 REF	

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