WANSEMI
万芯半导体

WX012D04KD

Enhancement Mode N+P-Channel Power MOSFET

TO-252-4L/N+PMOS/40V/±20V/1.9V/30A/12mΩ

-40V/±20V/-1.9V/-28A/30mΩ

Rev0.1

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

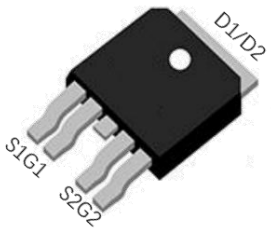
V_{DS}	$R_{DS(on)}$ Typ.	I_D
40V	12mΩ @ 10V	30A
	15mΩ @ 4.5V	

- P-Channel

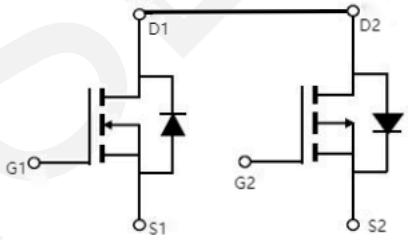
V_{DS}	$R_{DS(on)}$ Typ.	I_D
-40V	30mΩ @ -10V	-28A
	37mΩ @ -4.5V	

2.Applications

- DC motor
- PWM applications



TO-252-4L
Pin Description



N-Channel P-Channel

Schematic Diagram

3.Package Marking and Ordering Information

Part no.	Marking	Package	PCS/Reel	PCS/CTN.
WX012D04KD	012D04	TO-252-4L	2500	25000

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	30	-28	A
Drain Current (Pulse), PW≤300μs	I_{DM}	120	-112	A
Total Dissipation	P_D	25	31.3	W
Avalanche Energy, Single Pulsed	EAS	49	48	mJ
Junction Temperature	T_j	150	150	℃
Storage Temperature	T_{stg}	-55 to +150	-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 (Note 2)

Parameter	Symbol	N-chanel	P-chanel	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	5	4	℃/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	1.2	1.9	2.3	V
Static Drain to Source On-State Resistance	$R_{DS(on)}$	I_D = 20A, V_{GS} = 10V	-	12	16	mΩ
		I_D = 10A, V_{GS} = 4.5V	-	15	22	mΩ
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=20V, Frequency=1.0MHz	-	1125	-	pF
Output Capacitance	C_{oss}		-	81	-	pF
Reverse Transfer Capacitance	C_{rss}		-	73	-	pF
Turn-ON Delay Time	$t_{d(on)}$	V_{DD} =20V, V_{GS} = 10V, R_L = 1Ω, R_G=3Ω	-	6	-	ns
Rise Time	t_r		-	12	-	ns
Turn-OFF Delay Time	$t_{d(off)}$		-	26	-	ns
Fall Time	t_f		-	7	-	ns
Total Gate Charge	Q_g	V_{DS} = 20V, V_{GS} = 10V, I_D = 8A	-	18	-	nC
	Q_{gs}		-	2.5	-	nC
	Q_{gd}		-	4.2	-	nC
Diode Forward Voltage	V_{FSD}	I_S =20A, V_{GS} = 0V	0.5	-	1.2	V

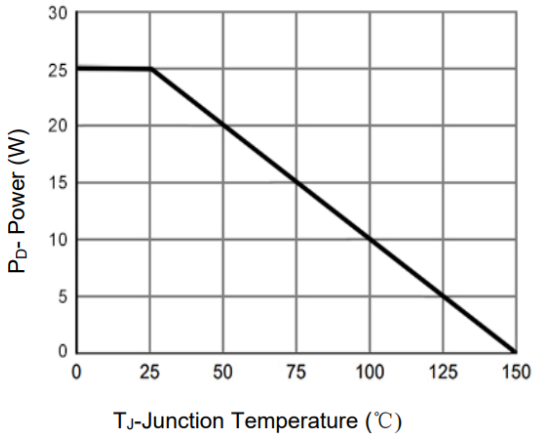
P-Channel

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	-1.2	-1.9	-2.3	V
Static Drain to Source On-State Resistance	$R_{DS(on)}$	I_D = -8A, V_{GS} = -10V	-	30	39	mΩ
		I_D =-5A, V_{GS} =-4.5V	-	37	50	mΩ
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=-20V, Frequency=1.0MHz	-	1240	-	pF
Output Capacitance	C_{oss}		-	93	-	pF
Reverse Transfer Capacitance	C_{rss}		-	85	-	pF
Turn-ON Delay Time	$t_{d(on)}$	V_{DD} = -20V V_{GS} = -10V R_{GEN} =3Ω, R_L=1Ω,	-	11	-	ns
Rise Time	t_r		-	14	-	ns
Turn-OFF Delay Time	$t_{d(off)}$		-	31	-	ns
Fall Time	t_f		-	19	-	ns
Total Gate Charge	Q_g	V_{DS} = -20V, V_{GS} = -10V, I_D = -8A	-	25	-	nC
	Q_{gs}		-	3	-	nC
	Q_{gd}		-	7	-	nC
Diode Forward Voltage	V_{FSD}	I_S = -8A, V_{GS} = 0V	-0.5	-	-1.2	V

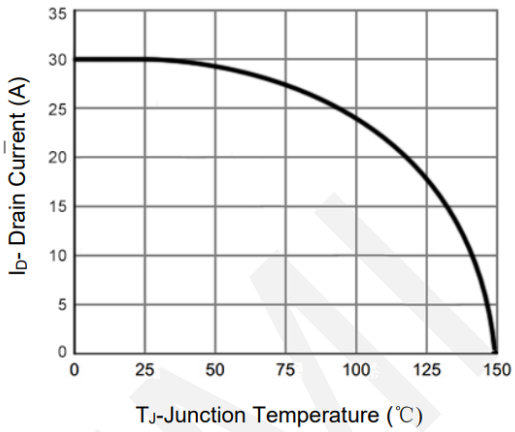
Note 3: Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

7.Typical electrical and thermal characteristics

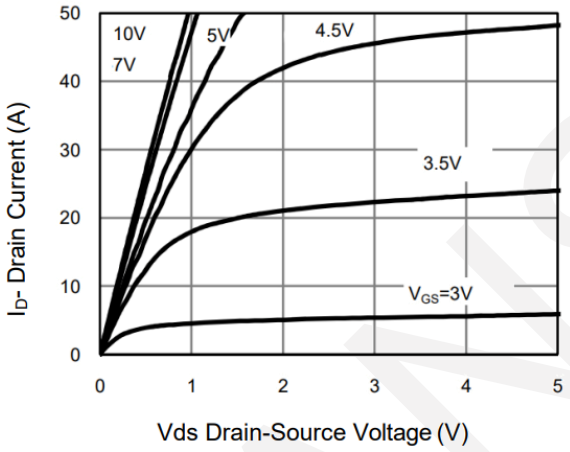
N-Channel



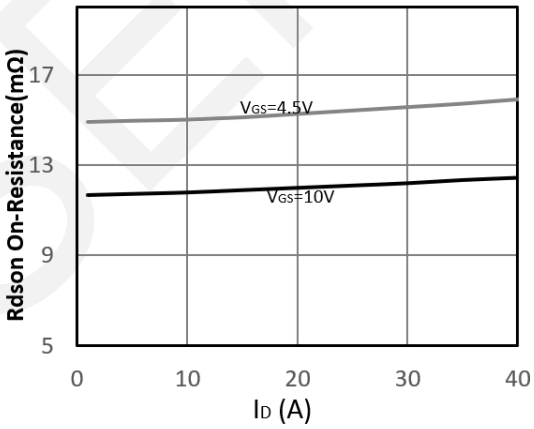
Power De-rating



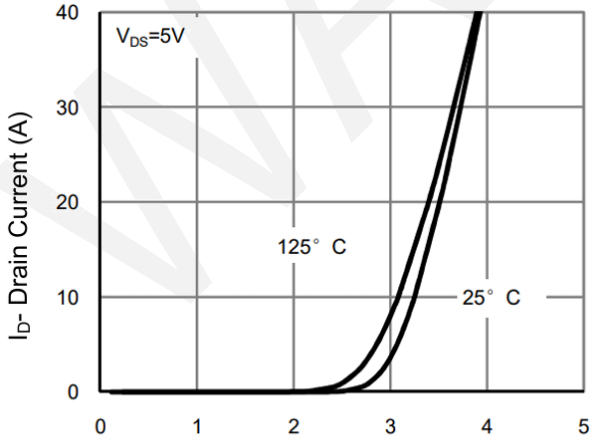
Drain Current



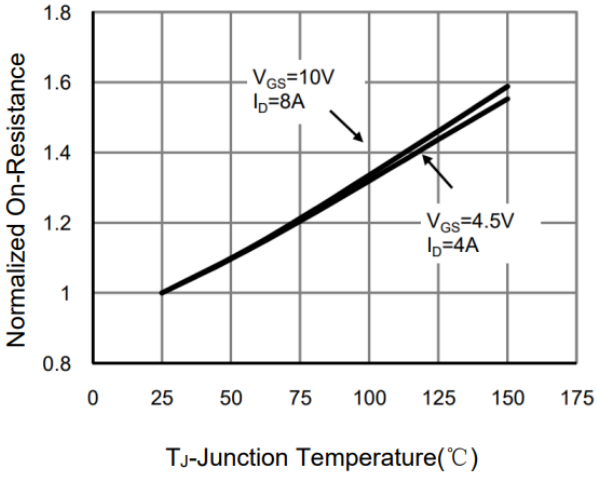
Output Characteristics



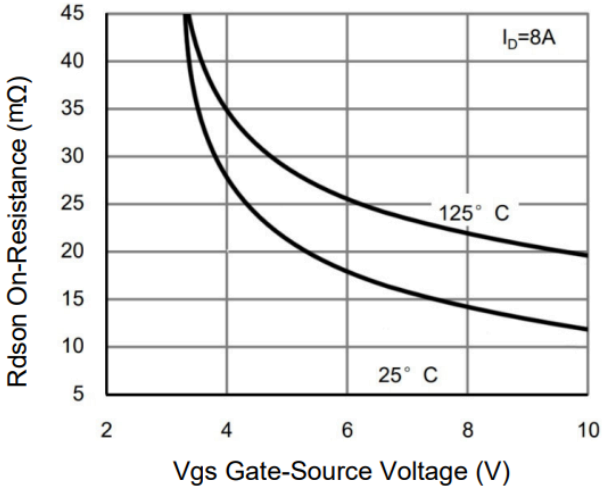
Rdson vs Drain Current



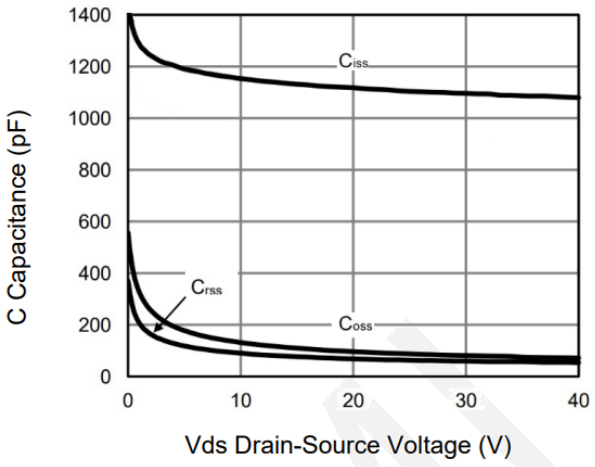
Transfer Characteristics



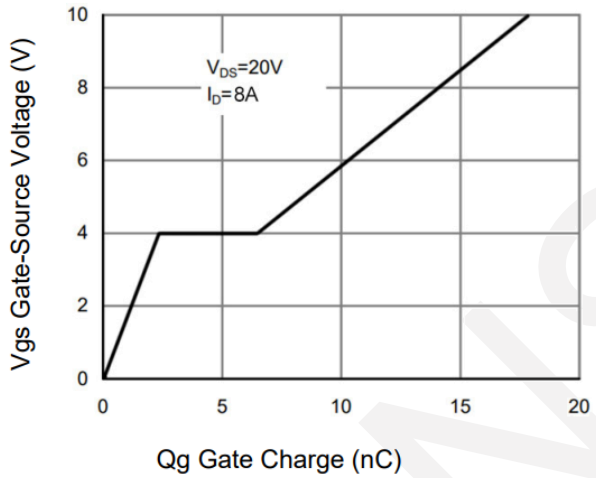
Rdson vs Junction Temperature



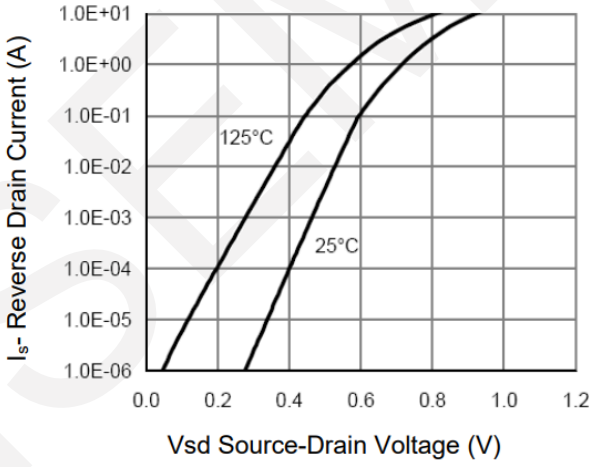
Rdson vs Vgs



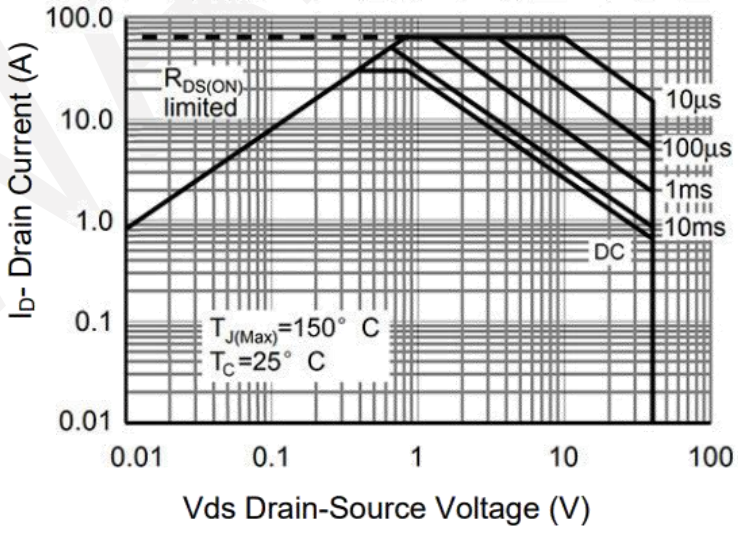
Capacitance vs Vds



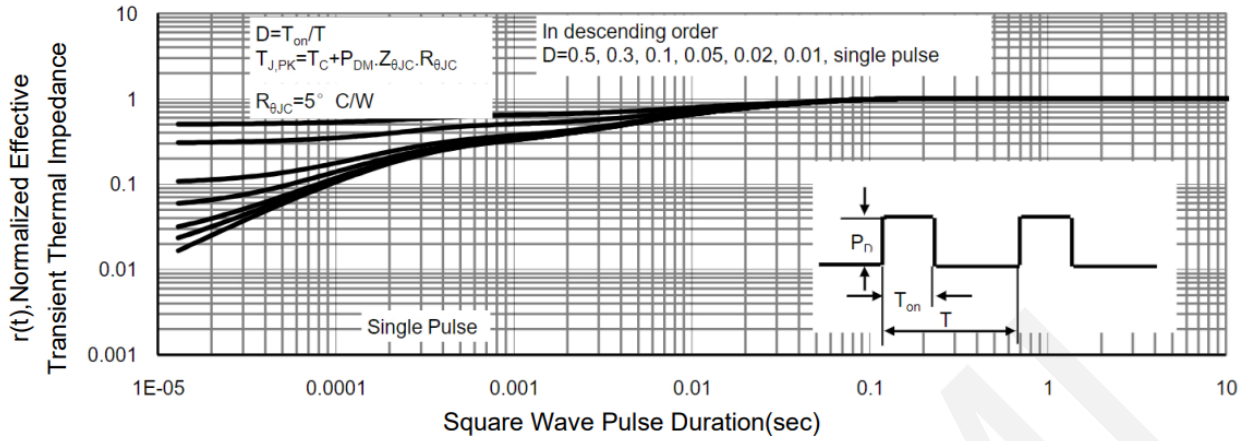
Gate Charge



Source- Drain Diode Forward

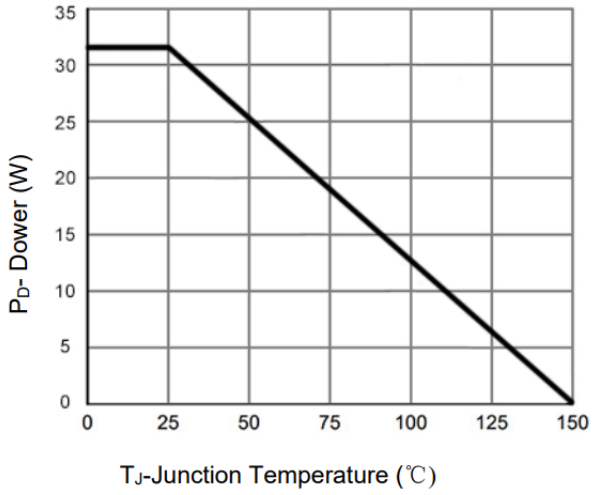


Safe Operating Area

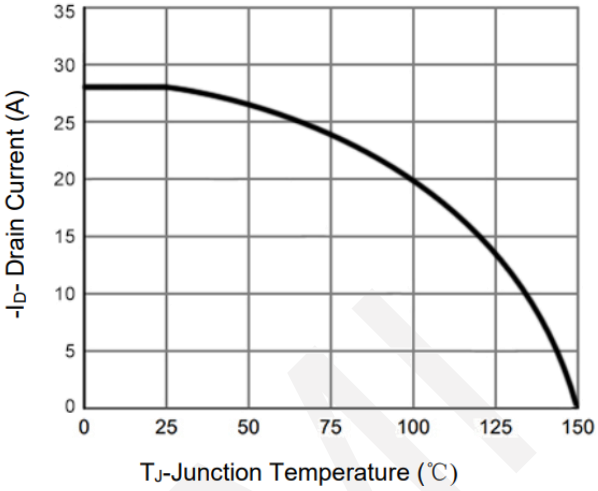


Normalized Maximum Transient Thermal Impedance

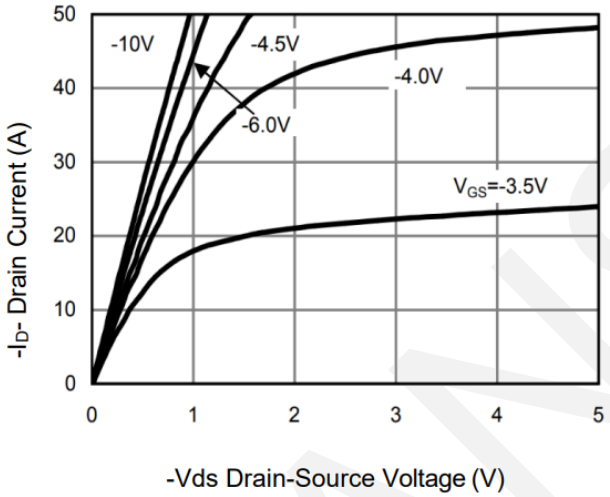
P-Channel



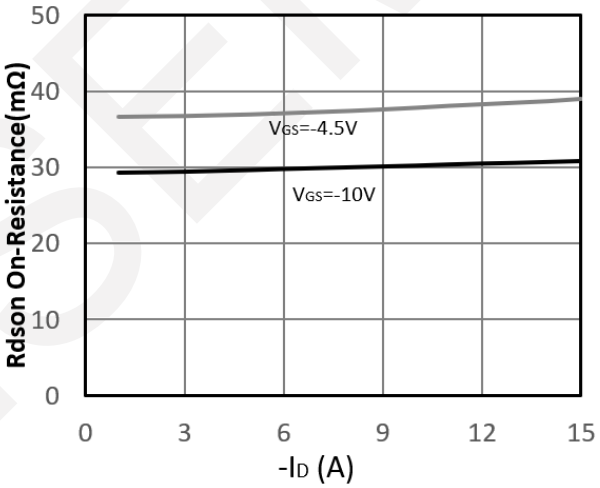
Power De-rating



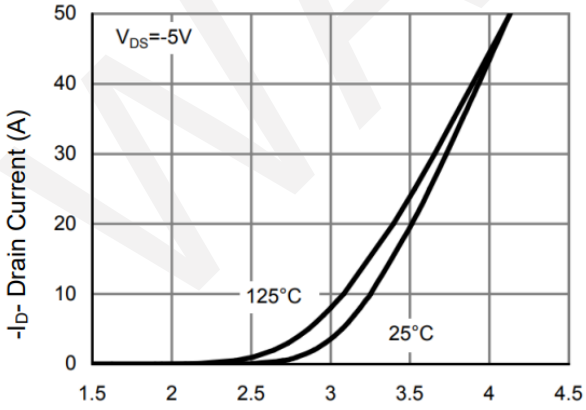
Drain Current



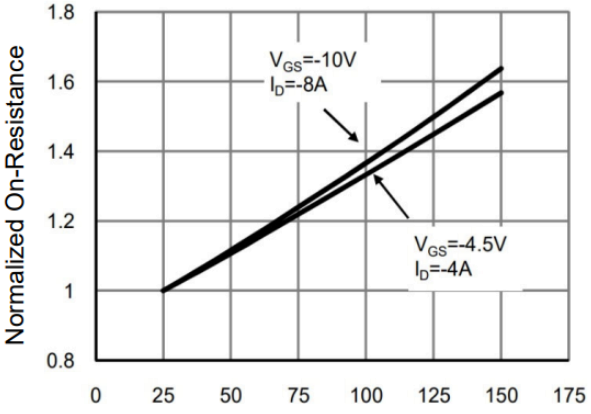
Output Characteristics



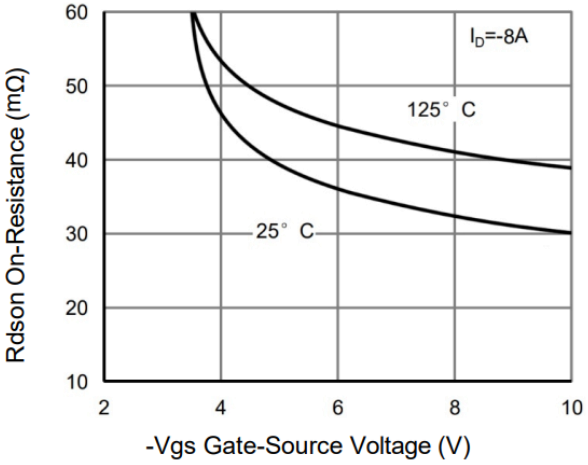
Rdson vs Drain Current



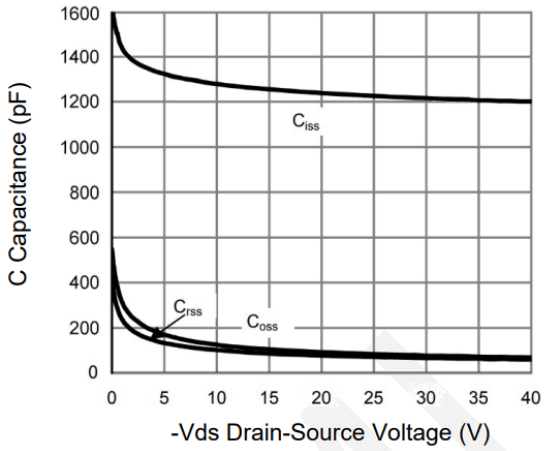
Transfer Characteristics



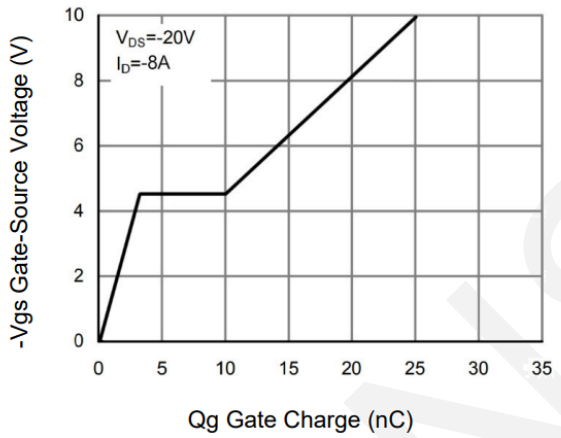
Rdson vs Junction Temperature



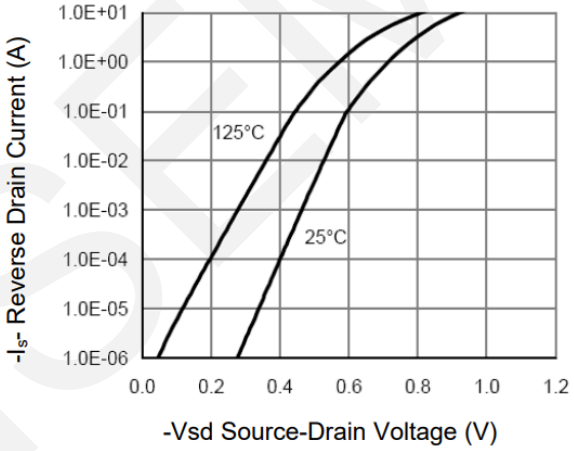
Rdson vs Vgs



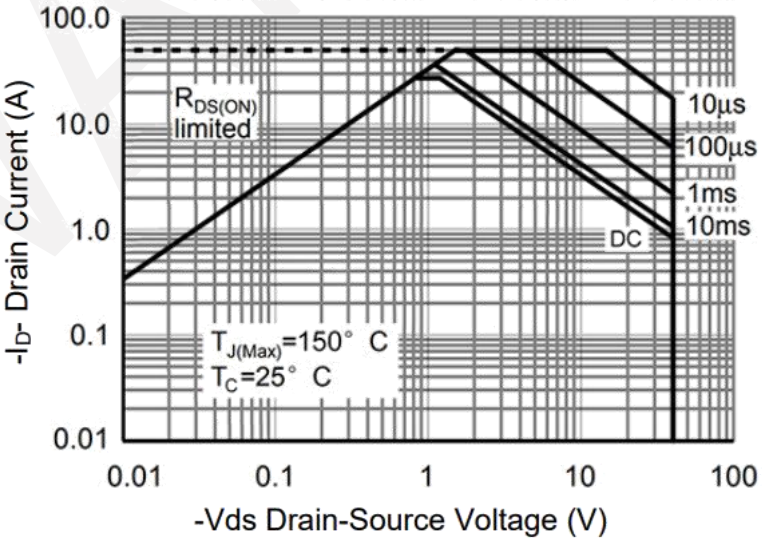
Capacitance vs Vds



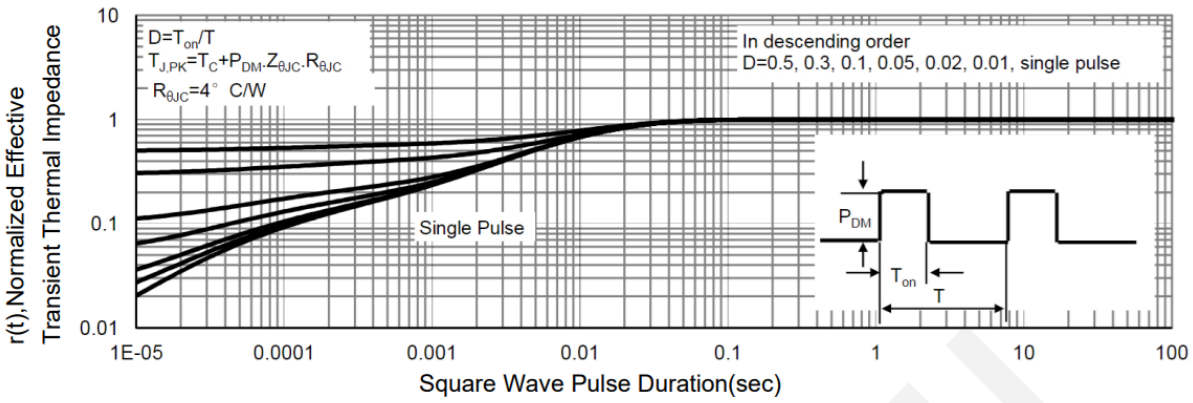
Gate Charge



Source- Drain Diode Forward

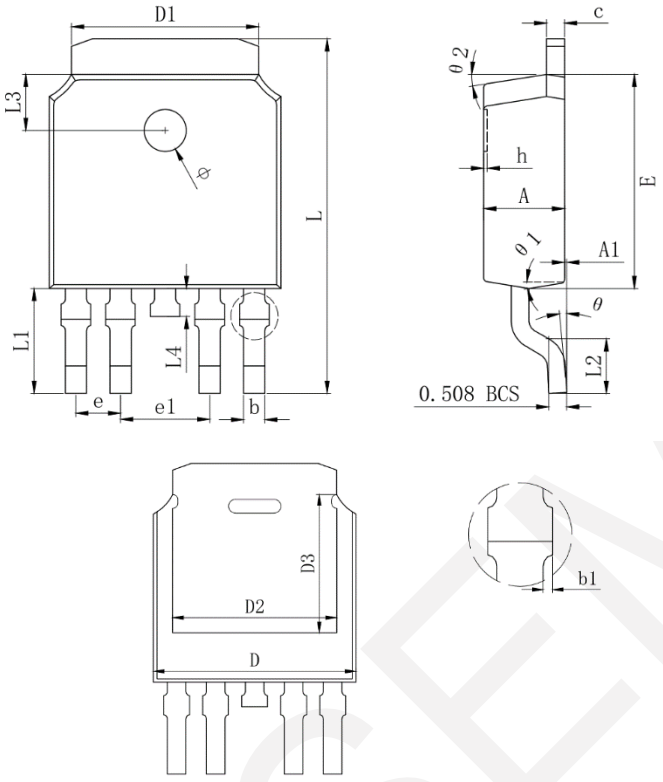


Safe Operating Area



Normalized Maximum Transient Thermal Impedance

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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