AP2716KD

N and P-Channel Enhancement Mosfet

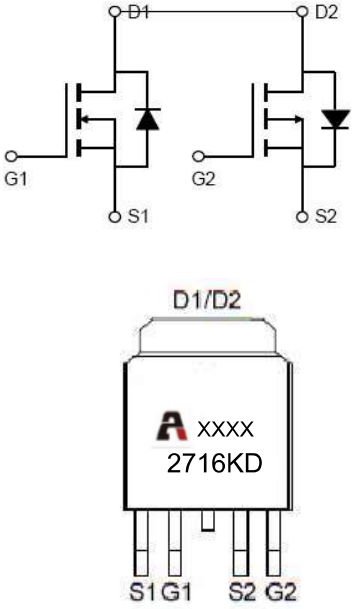
DATA SHEET

Feature

- **N-Channel**
  V_{DD}=40V,I_D=20A
  $R_{DS(ON)}$ <22mΩ @V_{GS}=10V
  $R_{DS(ON)}$ <30mΩ @V_{GS}=4.5V

- **P-Channel**
  V_{DD}=-40V,I_D=-20A
  $R_{DS(ON)}$ <54mΩ @V_{GS}=-10V
  $R_{DS(ON)}$ <70mΩ @V_{GS}=-4.5V

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



Marking and pin assignment

Application

- PWM applications
- Load Switch
- Power management

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
2716KD	AP2716KD	TO-252-4		-	2500

ABSOLUTE MAXIMUM RATINGS (T_a=25℃ unless otherwise noted)

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V_{DS}	40	-40	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Continuous Drain Current (T_a =25℃)	I_D	20	-20	A
Continuous Drain Current (T_a =100℃)	I_D	14	-14	A
Pulsed Drain Current (1)	I_{DM}	60	-60	A
Power Dissipation	P_D	31.5	31.5	W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	80	80	℃/W
Junction Temperature	T_J	150	150	℃
Storage Temperature	T_{STG}	-55~ +150	-55~ +150	℃

N-CH ELECTRICAL CHARACTERISTICS(T_a=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D =-250μA	40			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =40V, V_{GS} = 0V			1	μA
Gate-body leakage current	I_{GSS}	V_{GS} =±20V, V_{DS} = 0V			±100	nA
Gate threshold voltage(2)	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	1	1.6	2.5	V
Drain-source on-resistance(2)	$R_{DS(on)}$	V_{GS} =10V, I_D =4A		16	22	mΩ
		V_{GS} =4.5V, I_D =6A		22	30	
Dynamic characteristics						
Input Capacitance	C_{iss}	V_{DS} =20V, V_{GS} =0V, f =1MHz		1050		pF
Output Capacitance	C_{oss}			84		
Reverse Transfer Capacitance	C_{rss}			72		
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	V_{DD}=20V, I_D=5A, R_L=6Ω V_{GS}=10V, R_G=1Ω		11		ns
Turn-on rise time	t_r			13		
Turn-off delay time	$t_{d(off)}$			36		
Turn-off fall time	t_f			9		
Total Gate Charge	Qg	VDS=20V, ID=5A, VGS=10V		11		nC
Gate-Source Charge	Qgs			1.9		
Gate-Drain Charge	Qgd			2.2		
Source-Drain Diode characteristics						
Diode Forward voltage(2)	V_{DS}	V_{GS} =0V, I_S=10A			1.2	V
Diode Forward current(3)	I_S		-	-	10	A

P-CH ELECTRICAL CHARACTERISTICS(T_a=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D =-250μA	-40			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =-40V, V_{GS} = 0V			1	μA
Gate-body leakage current	I_{GSS}	V_{GS} =±20V, V_{DS} = 0V			±100	nA
Gate threshold voltage(2)	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =-250μA	-1	-1.6	-2.5	V
Drain-source on-resistance(2)	$R_{DS(on)}$	V_{GS} =-10V, I_D =-10A		44	54	mΩ
		V_{GS} =-4.5V, I_D =-6A		55	70	
Dynamic characteristics						
Input Capacitance	C_{iss}	V_{DS} =-20V, V_{GS} =0V, f =1MHz		1160		pF
Output Capacitance	C_{oss}			155		
Reverse Transfer Capacitance	C_{rss}			98		
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	V_{DD}=-20V, I_D=-5A, R_L=6Ω V_{GS}=-10V, R_G=1Ω		8		ns
Turn-on rise time	t_r			15		
Turn-off delay time	$t_{d(off)}$			23		
Turn-off fall time	t_f			9		
Total Gate Charge	Qg	VDS=-20V, ID=-5A, VGS=-10V		20		nC
Gate-Source Charge	Qgs			3.5		
Gate-Drain Charge	Qgd			4.2		
Source-Drain Diode characteristics						
Diode Forward voltage(2)	V_{DS}	V_{GS} =0V, I_S=-10A			1.2	V
Diode Forward current(3)	I_S		-	-	-10	A

Notes:

1. Repetitive Rating: pulse width limited by maximum junction temperature
2. Pulse Test: pulse width≤300μs, duty cycle≤2%
3. Surface Mounted on FR4 Board,t≤10 sec

N-Channel

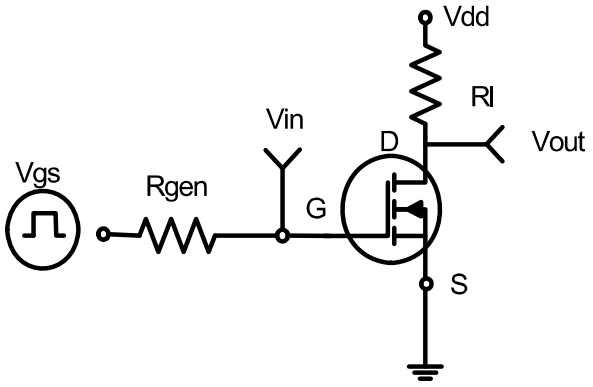


Figure 1:Switching Test Circuit

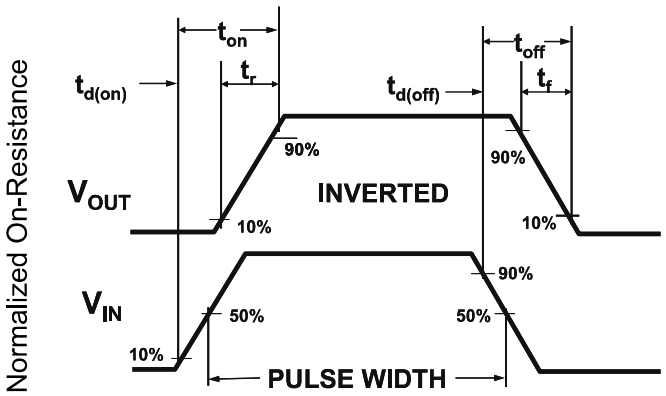


Figure 2:Switching Waveforms

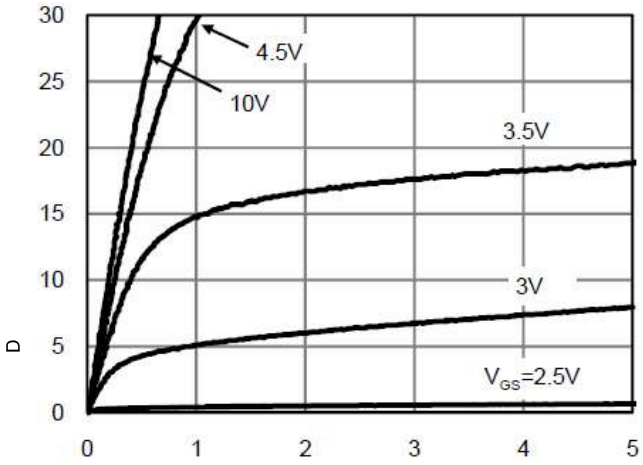


Figure 3 Output Characteristics

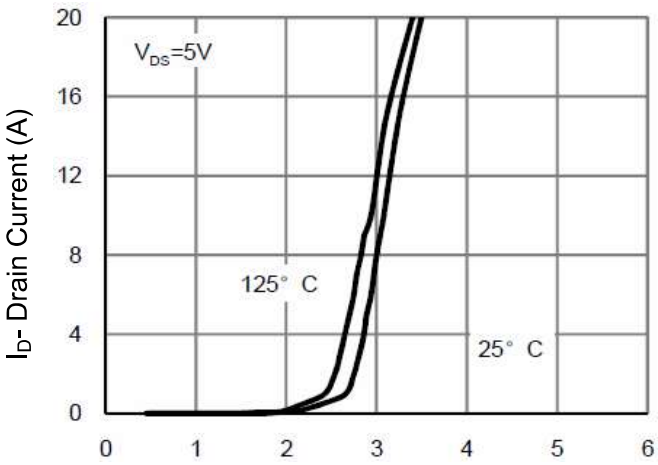


Figure 4 Transfer Characteristics

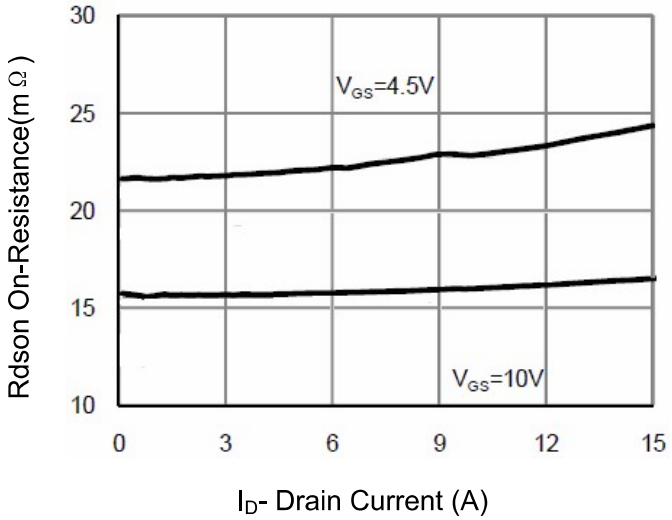


Figure 5 Drain-Source On-Resistance

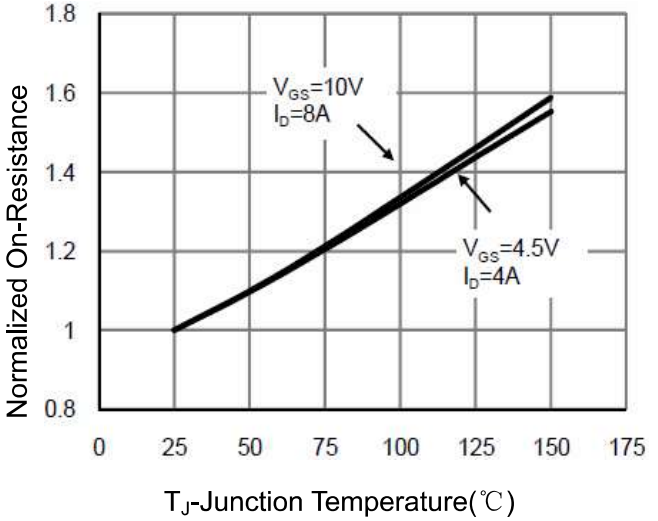


Figure 6 Drain-Source On-Resistance

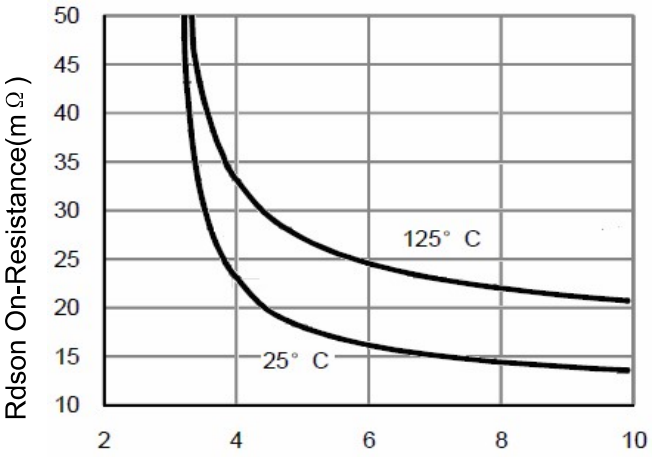


Figure7 Rdson vs Vgs

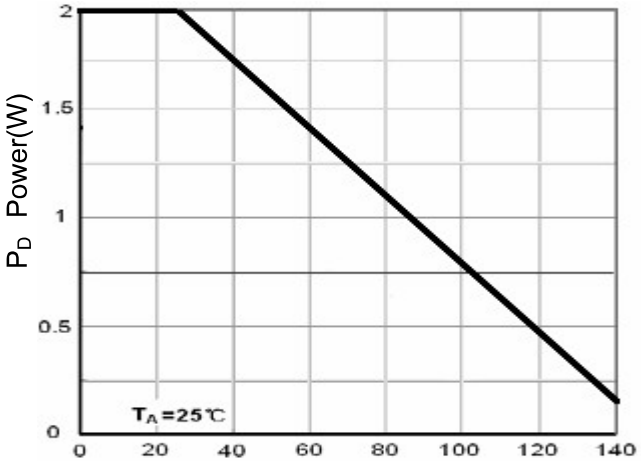


Figure 8 Power Dissipation

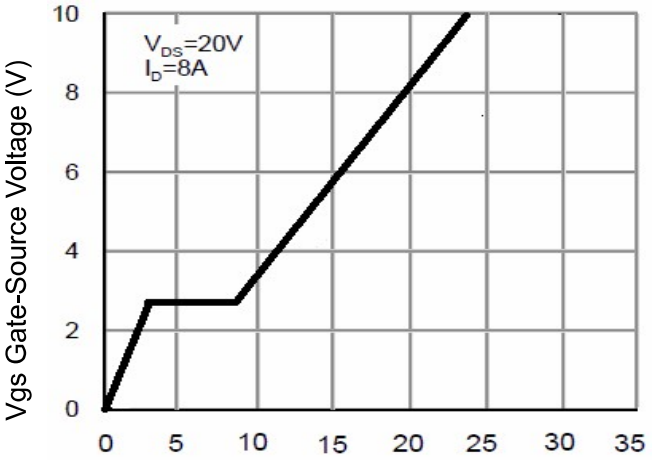


Figure 9 Gate Charge

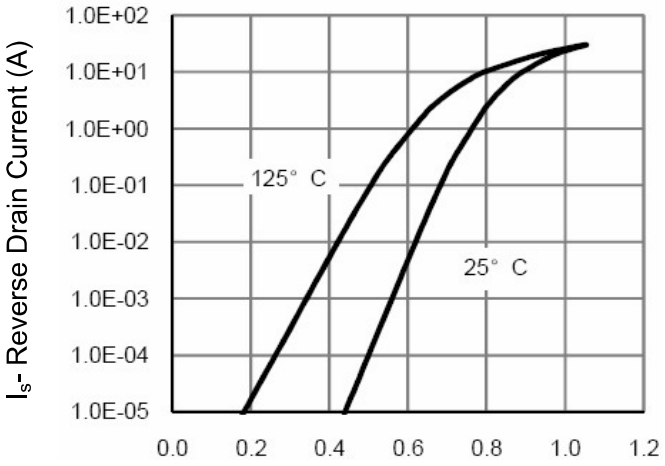


Figure 10 Source- Drain Diode Forward

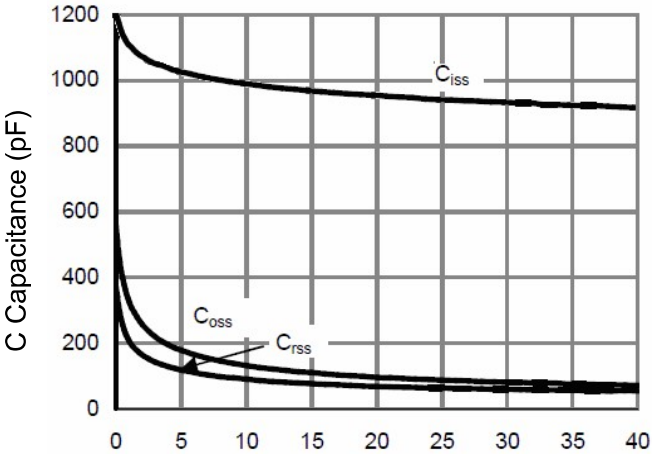


Figure 11 Capacitance vs Vds

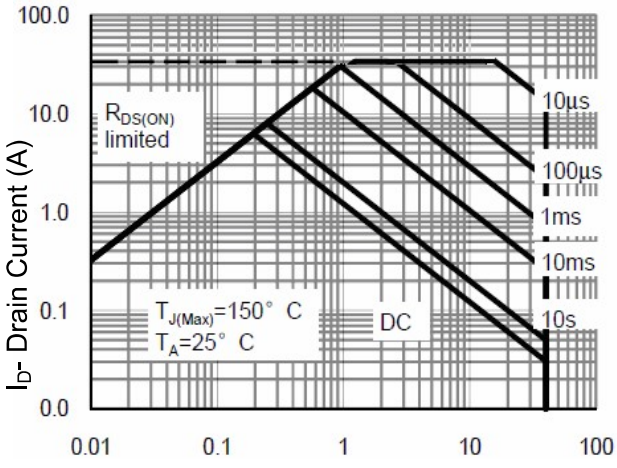


Figure 12 Safe Operation Area

P-Channel

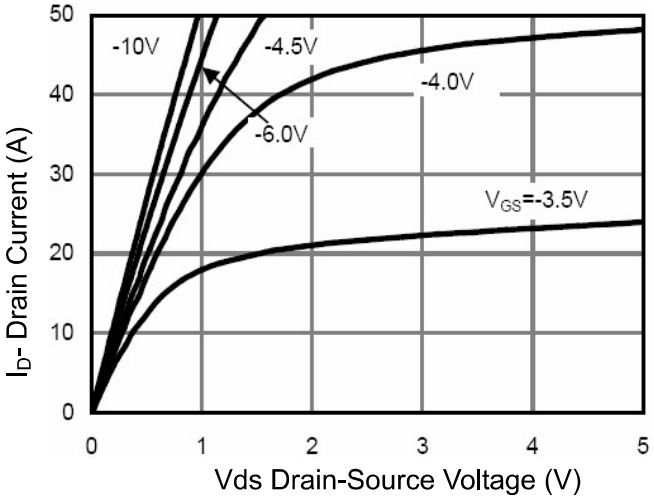


Figure 1 Output Characteristics

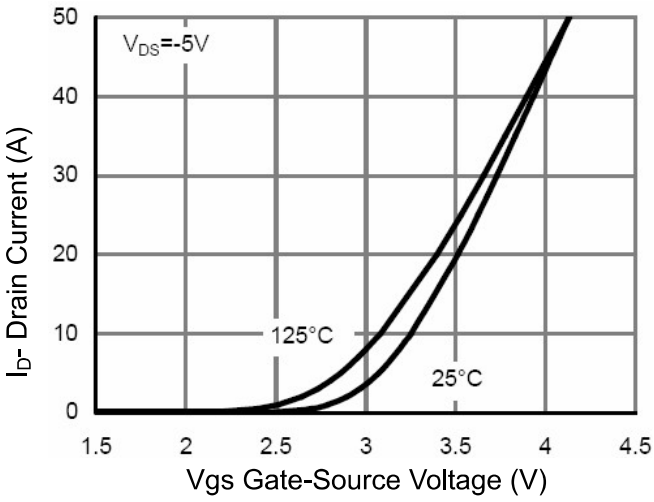


Figure 2 Transfer Characteristics

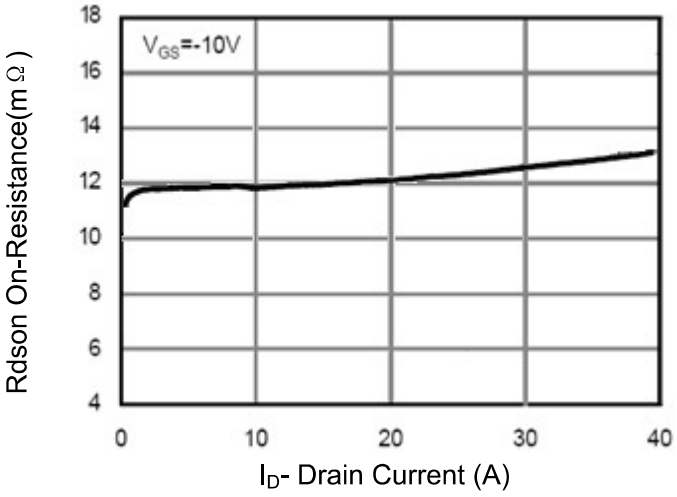


Figure 3 Rdson- Drain Current

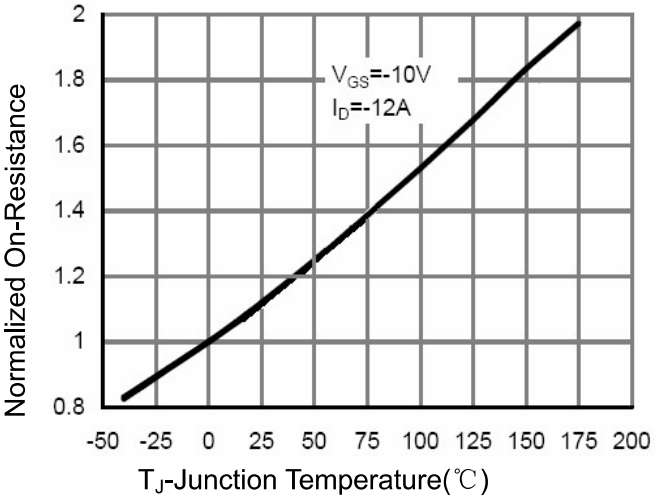


Figure 4 Rdson-Junction Temperature

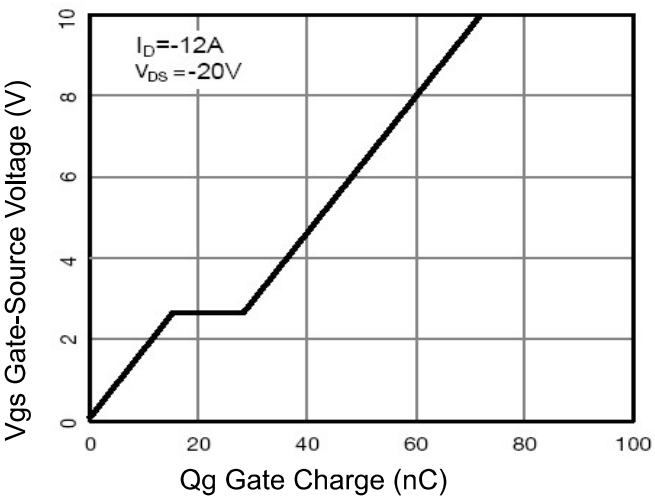


Figure 5 Gate Charge

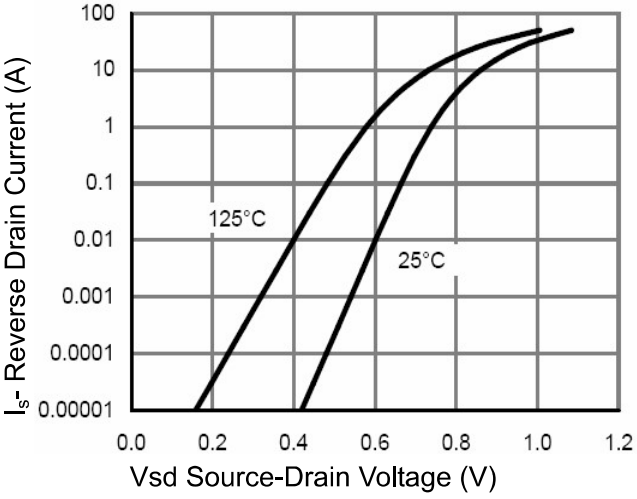


Figure 6 Source- Drain Diode Forward

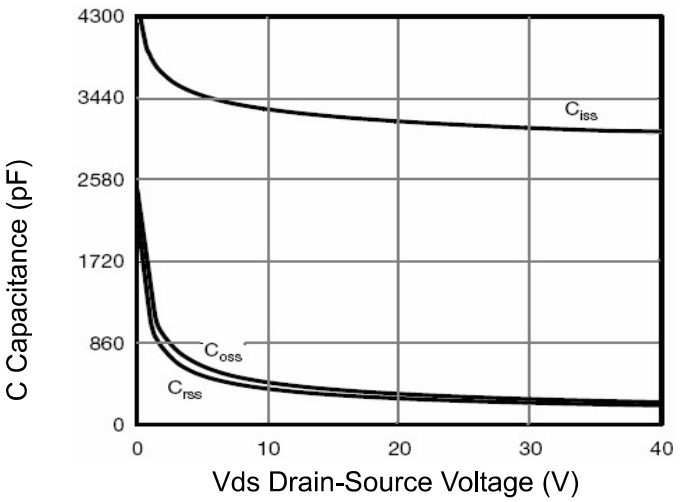


Figure 7 Capacitance vs Vds

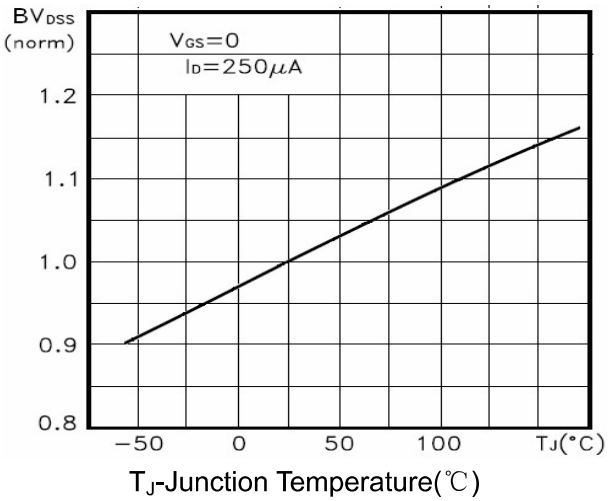


Figure 9 BV_{DSS} vs Junction Temperature

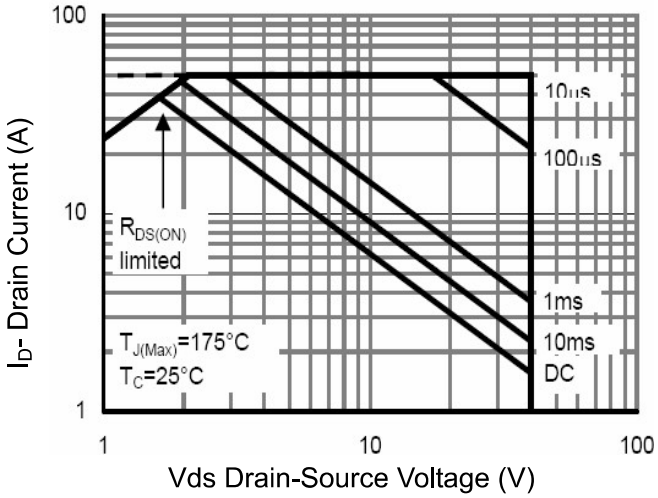


Figure 8 Safe Operation Area

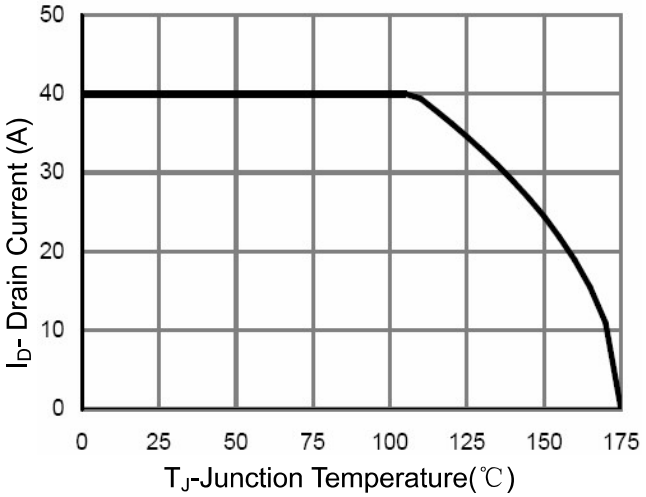


Figure 10 ID Current Derating vs Junction Temperature

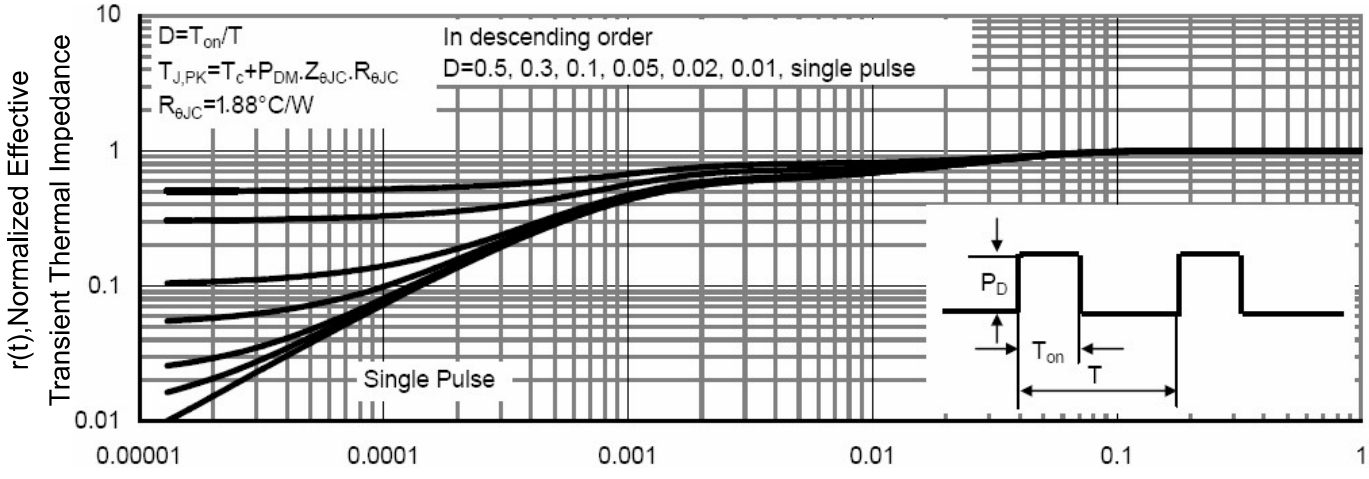
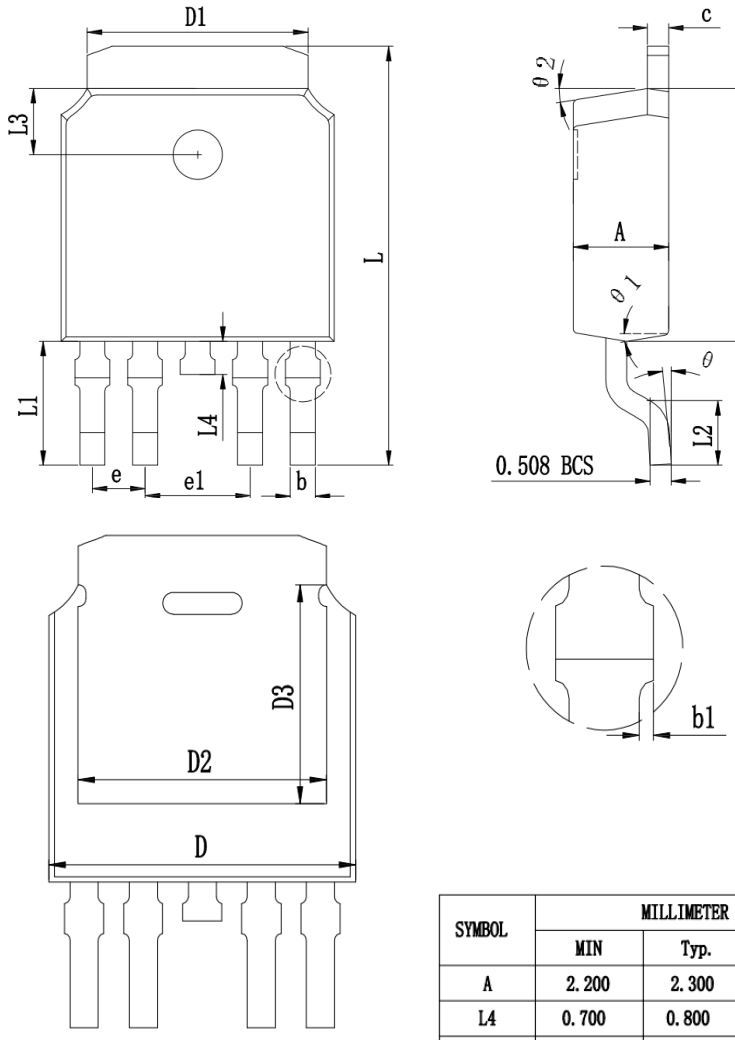


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-252-4 Package Information



SYMBOL	MILLIMETER		
	MIN	Typ.	MAX
A	2.200	2.300	2.400
L4	0.700	0.800	0.900
b	0.550	0.600	0.650
b1	0.000		0.120
c(电镀后)	0.460	0.520	0.580
D	6.350	6.600	6.650
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		
L3	1.600 REF		
L	9.900	10.100	10.300
L1	2.988 REF		
L2	1.400	1.550	1.700
L3	1.600 REF		
θ	0°		8°
θ1	9° TYP		
θ2	9° TYP		

Revision History

Revision	Release	Remark
V1.0	2023/06/01	Initial Release
V1.1	2024/07/27	Update POD

Disclaimer

The information given in this document describes the independent performance of the product,but similar performance is not guaranteed under other working conditions,and cannot be guaranteed when installed with other products or equipment.To achieve the required performance of the product in actual scenarios,the customer should conduct a complete application test to assess the functionality of the product.

Allpower assumes no responsibility for equipment failures result from using products at values that exceed the ratings,operating conditions,or other parameters listed in the product specifications.

The product described in this specification is not applicable for aerospace or other applications which
requires high reliability.Customers using or selling these products for use in medical,life-saving,or life-sustaining applications do so at their own risk and agree to fully indemnify.

Due to product or technical improvements,the information described or contained herein may be changed without prior notice.