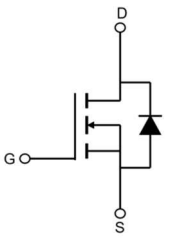
AP2080K

N-Channel Enhancement Mosfet

DATA SHEET

Feature

- 20V,50A
  $R_{DS(ON)}$ <11mΩ @V_{GS}=4.5V TYP=7 mΩ
  $R_{DS(ON)}$ <15mΩ @V_{GS}=2.5V TYP=9 mΩ
- Good stability and uniformity
- 100% avalanche tested
- Excellent package for good heat dissipation



Schematic Diagram



Marking and pin assignment

Application

- Halogen-free
- Battery protection
- Load switch
- Power management

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
2080K	AP2080K	TO-252		-	2500

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±12	V
Continuous Drain Current (T_C =25℃)(1)	I_D	50	A
Continuous Drain Current (T_C =100℃)	I_D	33	A
Pulsed Drain Current	I_{DM}	200	A
Single Pulsed Avalanche Energy(2)	EAS	65	mJ
Power Dissipation	P_D	48	W
Thermal Resistance from Junction to Case	$R_{\theta Jc}$	2.6	℃/W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	50	℃/W
Junction Temperature	T_J	150	℃
Storage Temperature	T_{STG}	-55~ +150	℃

Notes:

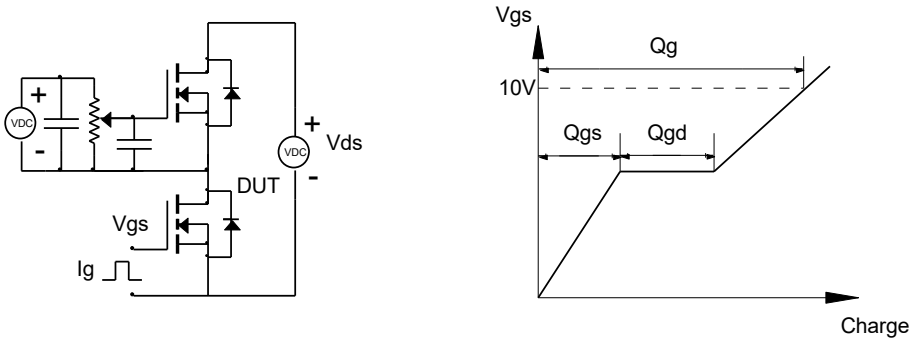
1) Repetitive Rating: pulse width limited by maximum junction temperature
2) EAS condition : T_J=25℃, V_{DD}=20V, V_G=10V, L=0.1mH, R_g=25Ω, I_{AS}=36A

MOSFET ELECTRICAL CHARACTERISTICS(T_J=25℃ unless otherwise noted)

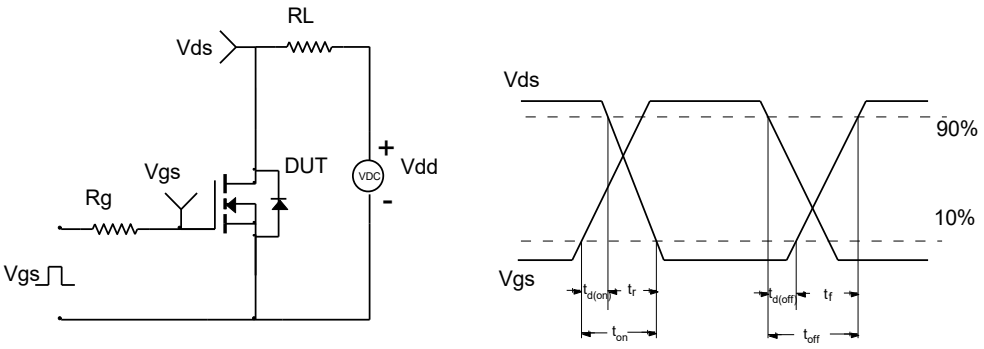
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D =250μA	20	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS} =20V, V_{GS} = 0V	-	-	1	μA
Gate-body leakage current	I_{GSS}	V_{GS} =±12V,V_{DS} = 0V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	0.5	0.7	1.2	V
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} =4.5V, I_D =8A	-	7	11	mΩ
		V_{GS} =2.5V, I_D =5A	-	9	15	
Dynamic characteristics						
Input Capacitance	C_{iss}	V_{DS} =20V, V_{GS} =0V, f =1MHz	-	1069	-	pF
Output Capacitance	C_{oss}		-	186	-	
Reverse Transfer Capacitance	C_{rss}		-	140	-	
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	V_{DD}=10V, I_D=10A, V_{GS}=4.5V, R_G=3Ω	-	7.5	-	ns
Turn-on rise time	t_r		-	31	-	
Turn-off delay time	$t_{d(off)}$		-	24	-	
Turn-off fall time	t_f		-	23	-	
Total Gate Charge	Qg	VDS=10V, ID=10A, VGS=4.5V	-	16	-	nC
Gate-Source Charge	Qgs		-	4.25	-	
Gate-Drain Charge	Qgd		-	1.65	-	
Source-Drain Diode characteristics						
Diode Forward voltage	V_{SD}	V_{GS} =0V, I_S=10A	-	0.75	1.2	V
Diode Forward current	I_S		-	-	50	A
Reverse recovery time	Trr	V_{DD} = 10 V, I_D = 10 A, di/dt = 100 A/μS		12.8		ns
Reverse recovery Charge	Qrr			21.5		nc

Test Circuit

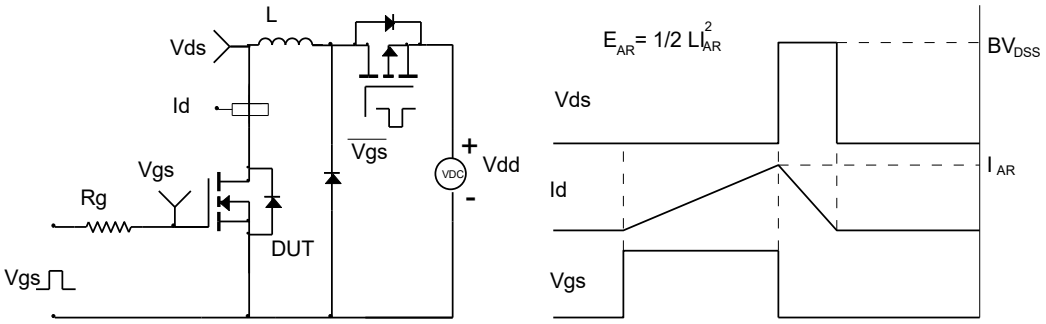
Gate Charge Test Circuit & Waveform



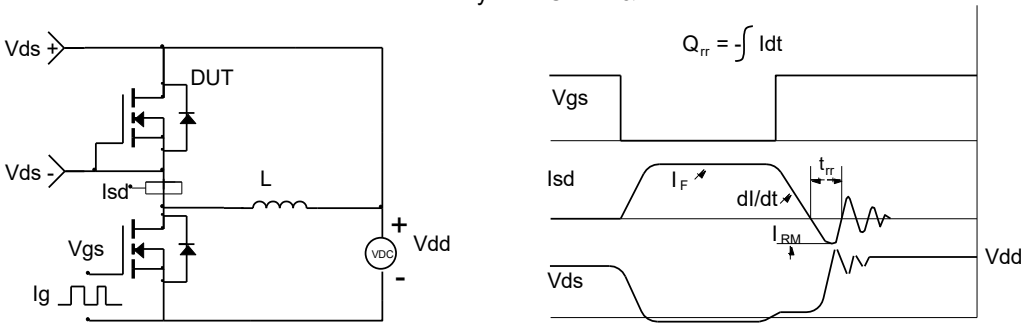
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Typical Performance Characteristics

Figure 1: On-Region Characteristics

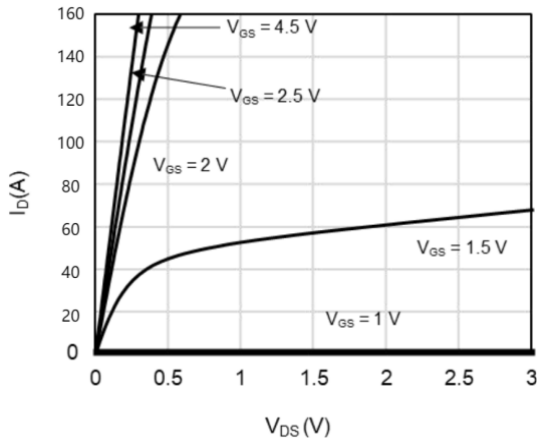


Figure 2: Transfer Characteristics

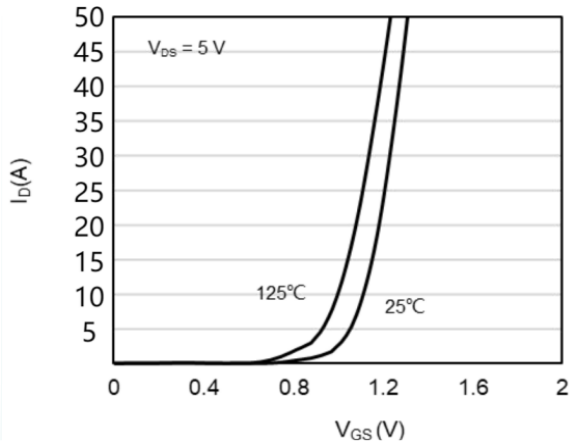


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

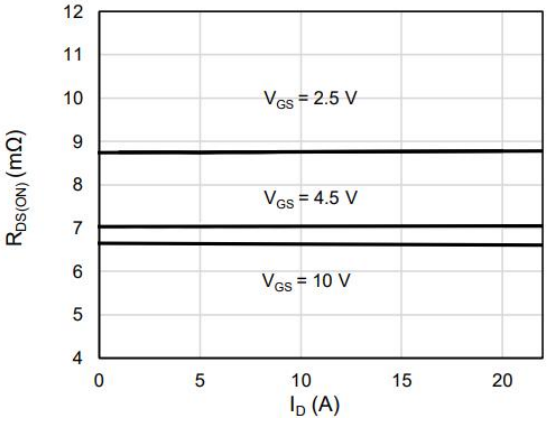


Figure 4: On-Resistance vs. Junction Temperature

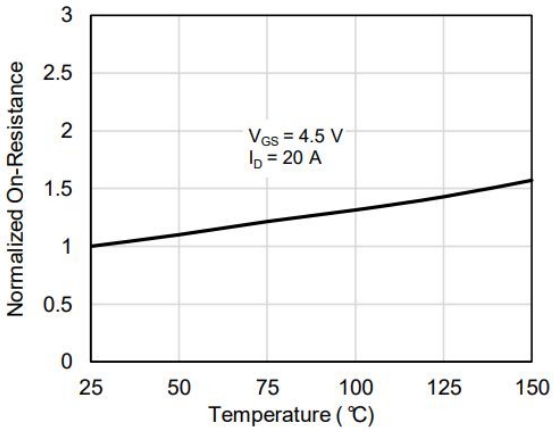


Figure 5: Breakdown Voltage vs. Junction Temperature

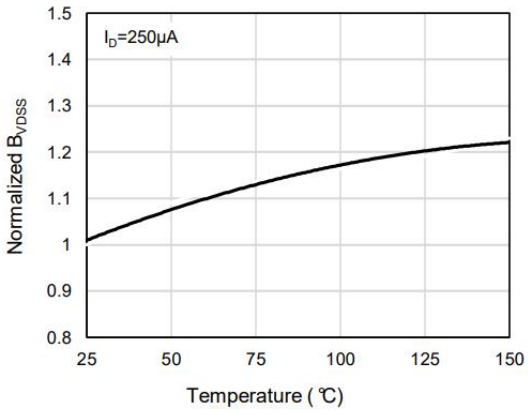
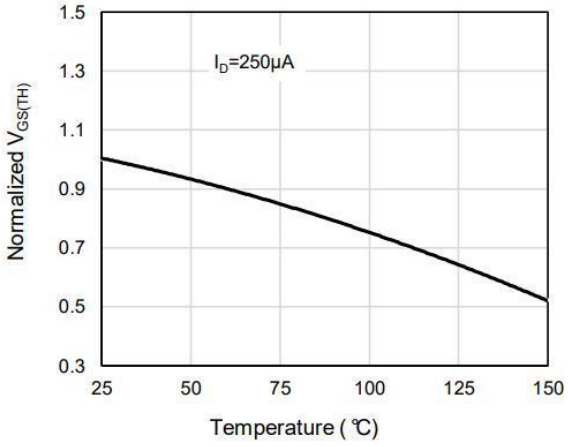


Figure 6: Threshold Voltage vs. Junction Temperature



Typical Performance Characteristics

Figure 7: Body-Diode Characteristics

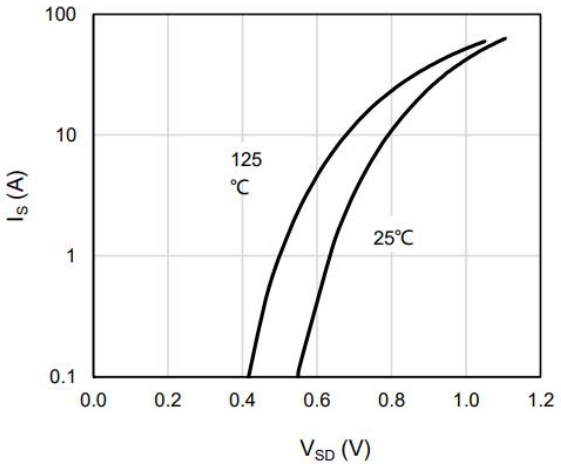


Figure 8: On-Resistance vs. Gate-Source Voltage

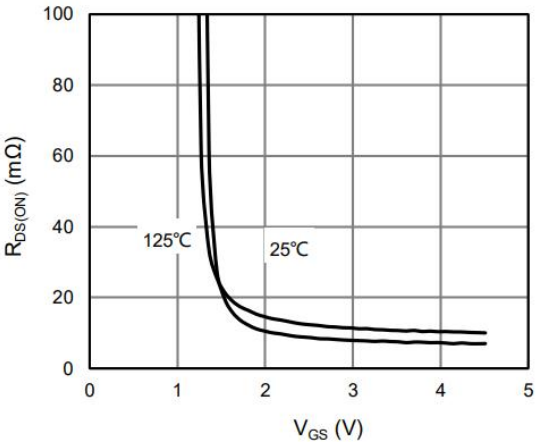


Figure 9: Capacitance Characteristics

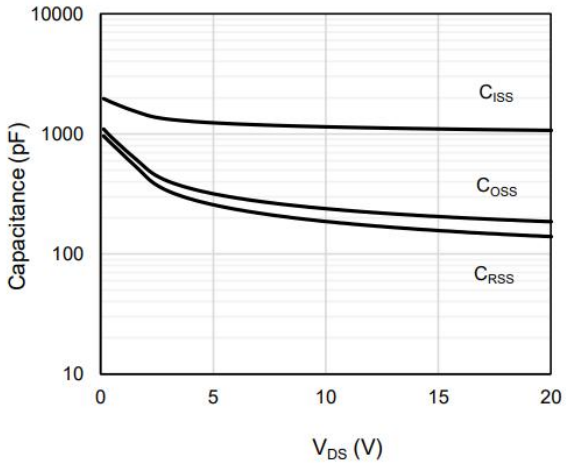


Figure 10: Gate-Charge Characteristics

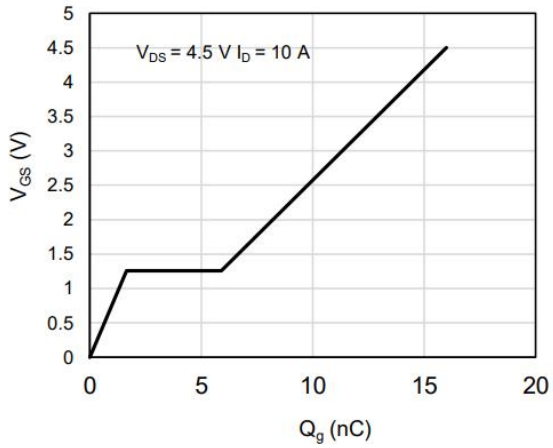


Figure 11: Power De-rating

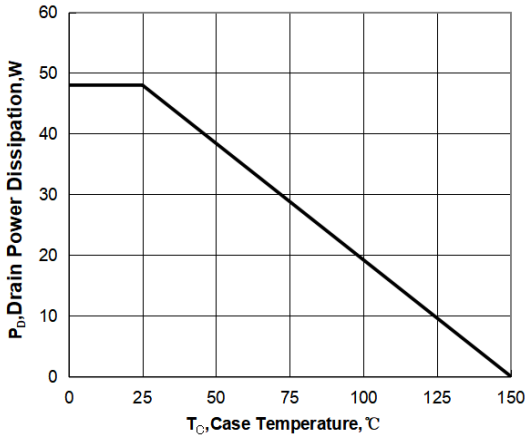
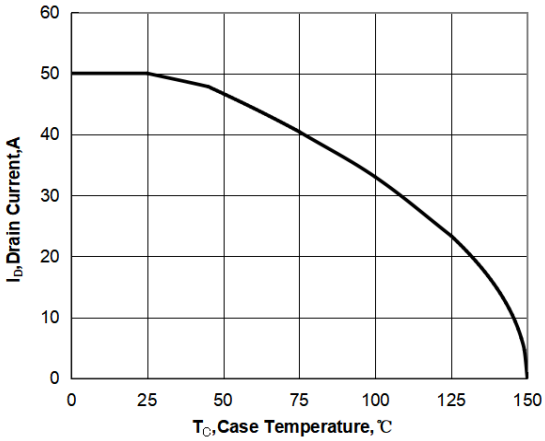


Figure 12: Current De-rating



Typical Performance Characteristics

Figure 13: Normalized Maximum Transient Thermal Impedance

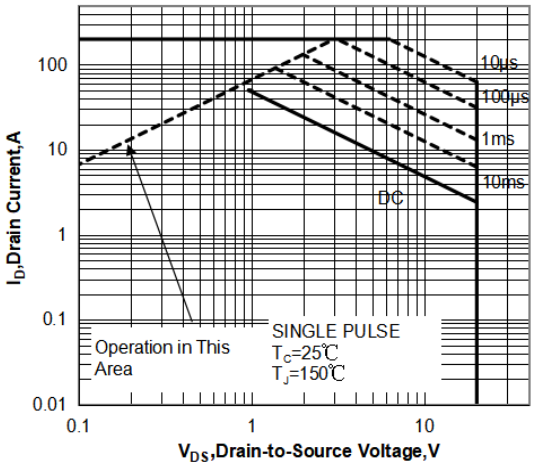
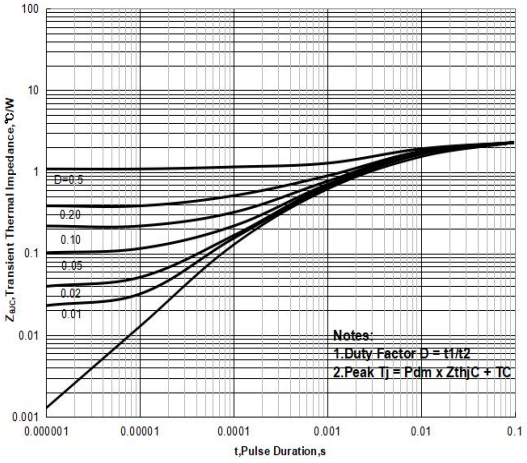
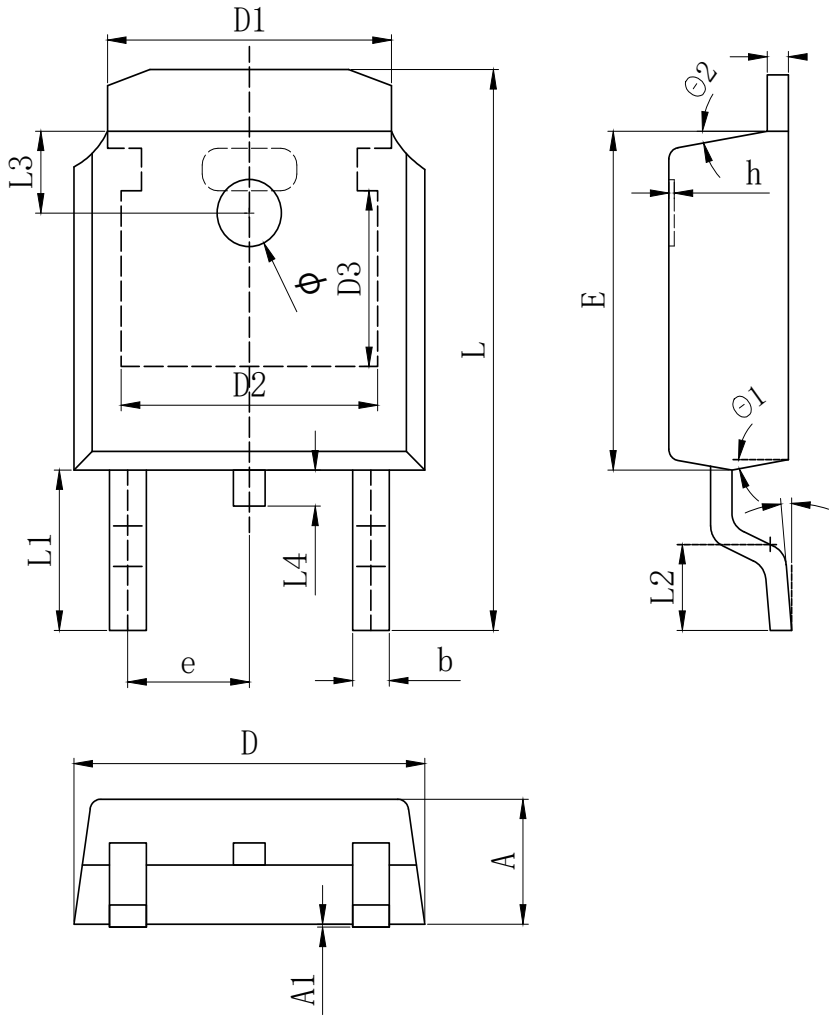


Figure 14: Maximum Forward Biased Safe Operating Area



TO-252 Package Information



SYMBOL	MILLIMETER		
	MIN	Typ.	MAX
A	2.200	2.300	2.400
A1	0.000		0.127
b	0.640	0.690	0.740
c(电镀后)	0.460	0.520	0.580
D	6.500	6.600	6.700
D1	5.334 REF		
D2	4.826 REF		
D3	3.166 REF		
E	6.000	6.100	6.200
e	2.286 TYP		
h	0.000	0.100	0.200
L	9.900	10.100	10.300
L1	2.888 REF		
L2	1.400	1.550	1.700
L3	1.600 REF		
L4	0.600	0.800	1.000
Φ	1.100	1.200	1.300
θ	0°		8°
θ1	9° TYP		
θ2	9° TYP		

Revision History

Revision	Release	Remark
V1.0	2024/04/02	Initial Release
V1.1	2025/03/15	Revision ID Value

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.