



UNI-SEMICONDUCTOR CO., LTD

宇力半导体有限公司



AP200N04 Data Sheet

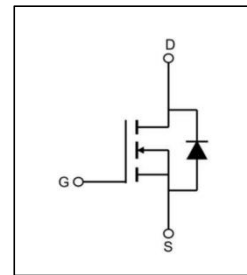
V 1.0

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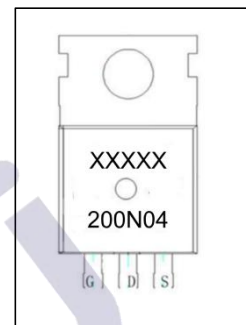
Feature

- 40V,160A
- $R_{DS(ON)} < 2.8 \text{ m}\Omega @ V_{GS}=10\text{V}$ TYP:2.4 m Ω
- $R_{DS(ON)} < 4.0 \text{ m}\Omega @ V_{GS}=4.5\text{V}$ TYP:3.2 m Ω
- Advanced Trench Technology
- Lead free product is acquired
- Excellent $R_{DS(ON)}$ and Low Gate Charge

Schematic Diagram



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)
200N04	AP200N04	TO-220	—	—	1000

ABSOLUTE MAXIMUM RATINGS (Ta=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current (Ta=25°C)	I_D	160	A
Continuous Drain Current (Ta =100°C)	I_D	112	A
Pulsed Drain Current ⁽¹⁾	I_{DM}	520	A
Singel Pulsed Avalanche Energy ⁽²⁾	E_{AS}	245	mJ
Power Dissipation	P_D	180	W
Thermal Resistance from Junction to Case ⁽⁴⁾	$R_{\theta JC}$	0.83	°C/W
Junction Temperature	T_J	150	°C
Storage Temperature	T_{STG}	-55~+150	°C

MOSFET ELECTRICAL CHARACTERISTICS(T_a=25°C unless otherwise noted)

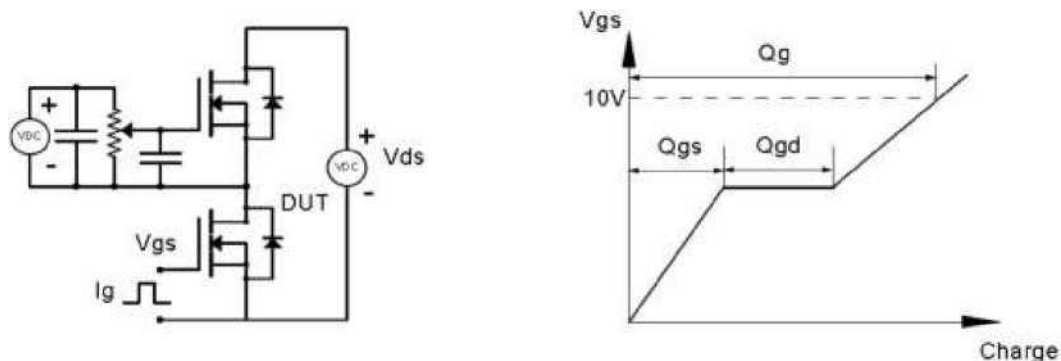
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D =250μA	40	—	—	V
Zero gate voltage drain current	I _{DSS}	V _{DS} =40V, V _{GS} = 0V	—	—	1	μA
Gate-body leakage current	I _{GSS}	V _{GS} =±20V, V _{DS} = 0V	—	—	±100	nA
Gate threshold voltage ⁽³⁾	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1	1.5	2.2	V
Drain-source on-resistance ⁽³⁾	R _{DS(on)}	V _{GS} =10V, I _D =50A	—	2.4	2.8	mΩ
		V _{GS} =4.5V, I _D =30A	—	3.2	4.0	
Dynamic characteristics						
Input Capacitance	C _{iss}	V _{DS} =20V, V _{GS} =0V, f=1MHz	—	6260	—	pF
Output Capacitance	C _{oss}		—	523	—	
Reverse Transfer Capacitance	C _{rss}		—	727	—	
Switching characteristics						
Turn-on delay time	t _{d(on)}	V _{DD} =20V, I _D =30A, R _L =1Ω V _{GS} =10V, R _G =3Ω	—	16.8	—	ns
Turn-on rise time	t _r		—	38.1	—	
Turn-off delay time	t _{d(off)}		—	116.4	—	
Turn-off fall time	t _f		—	33.4	—	
Total Gate Charge	Q _g	V _{DS} =20V, I _D =30A, V _{GS} =10V	—	129.6	—	nC
Gate-Source Charge	Q _{gs}		—	20.3	—	
Gate-Drain Charge	Q _{gd}		—	27.4	—	
Source-Drain Diode characteristics						
Diode Forward voltage ⁽³⁾	V _{DS}	V _{GS} =0V, I _S =10A	—	—	1.2	V
Diode Forward current ⁽⁴⁾	I _S		—	—	160	A
Body Diode Reverse Recovery Time	t _{rr}	T _J =25° , IF=30A, di/dt=100A/us	—	23.5	—	ns
Body Diode Reverse Recovery Charge	Q _{rr}	T _J =25° , IF=30A, di/dt=100A/us	—	12.8	—	nc

Notes:

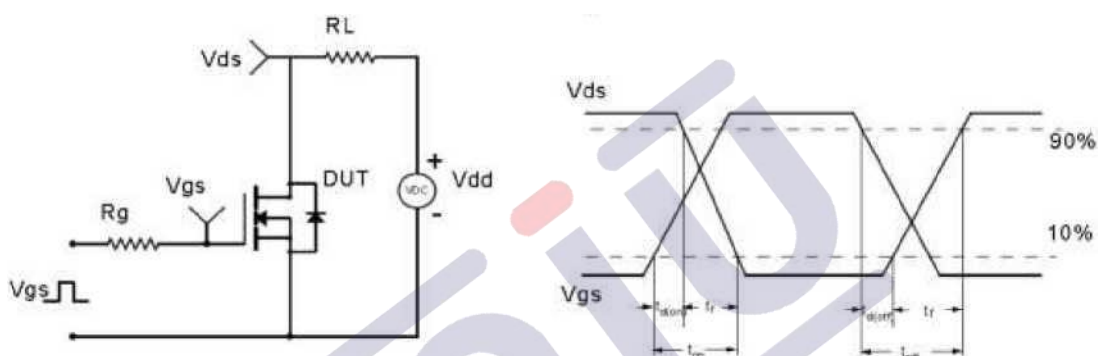
1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition: T_J=25°C, V_{DD}=20V, R_G=25Ω , L=0.5mH
3. Pulse Test: pulse width≤300μS, duty cycle≤2%
4. Surface Mounted on FR4 Board, t≤10 sec

Test Circuit & Waveform

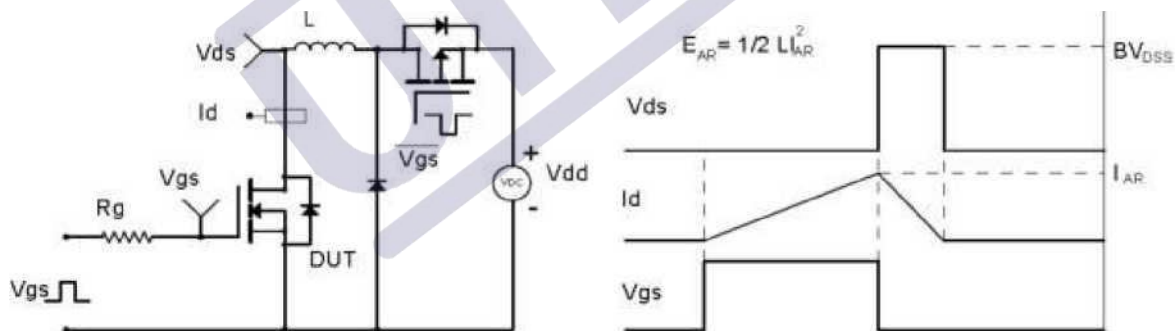
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

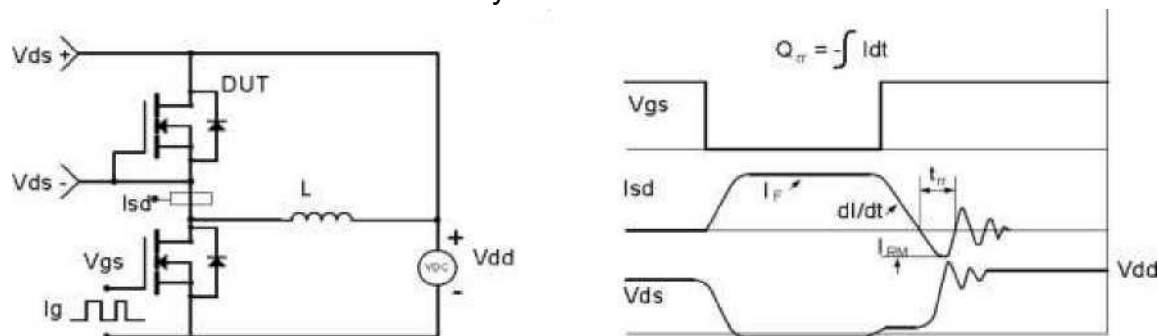


Fig1. Power Dissipation Derating Curve

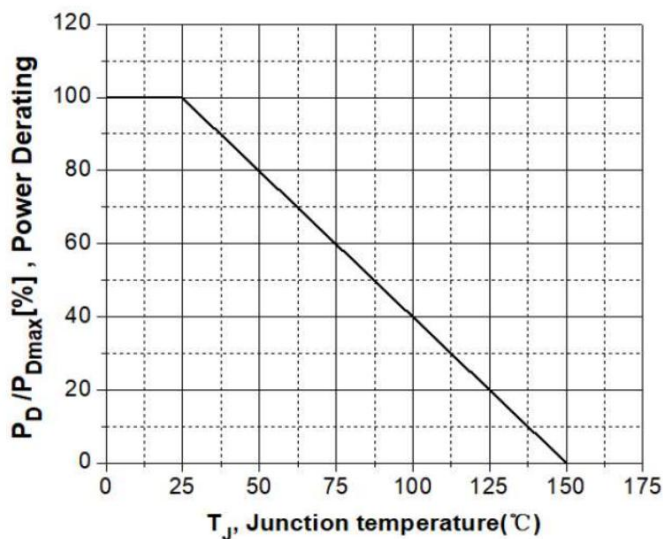


Fig2. Avalanche Energy Derating Curve vs. Junction Temperature

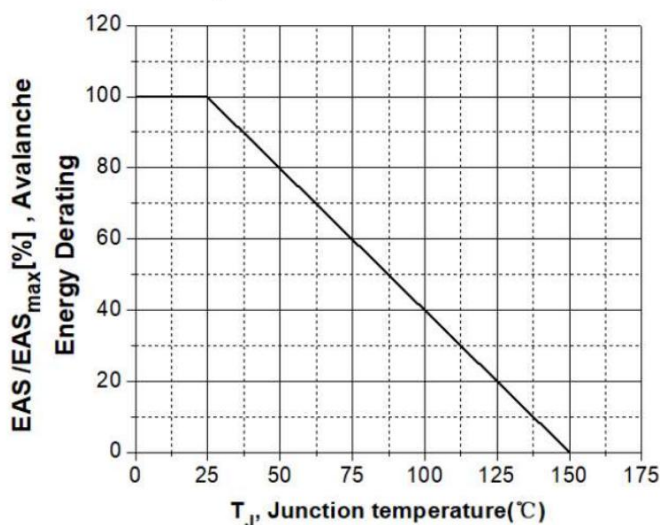


Fig3. Typical Output Characteristics @ $T_J = 125^{\circ}C$

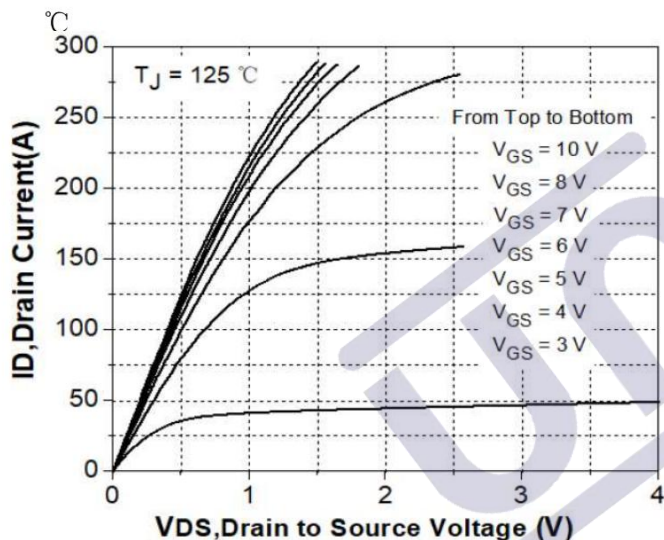


Fig4. Transconductance vs. Drain Current @ $T_J = -25/25/75/125^{\circ}C$

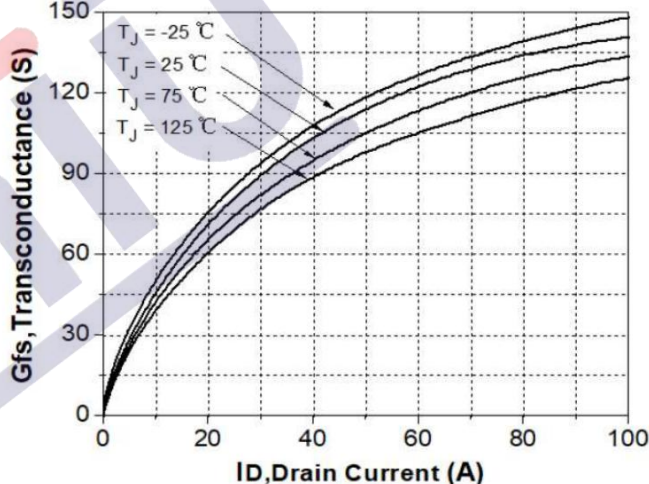


Fig5. Typical Transfer Characteristics @ $T_i = -25/25/75/125^{\circ}C$

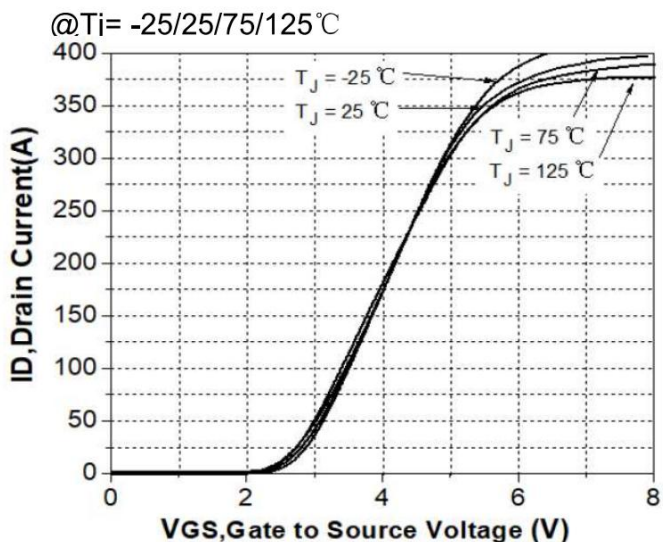


Fig6. Static Drain - Source On - State Resistance vs. Drain Current @ $T_i = -25^{\circ}C$

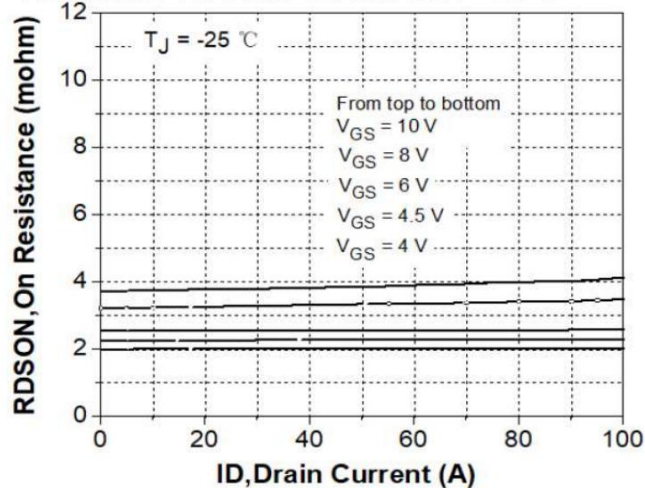


Fig7. Static Drain - Source On - State Resistance vs. Drain Current @Tj= 25 °C

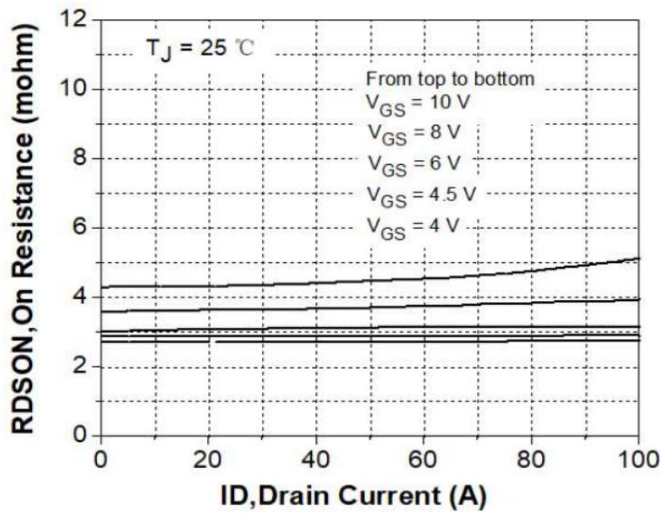


Fig8. Static Drain - Source On - State Resistance vs. Drain Current @Tj= 75 °C

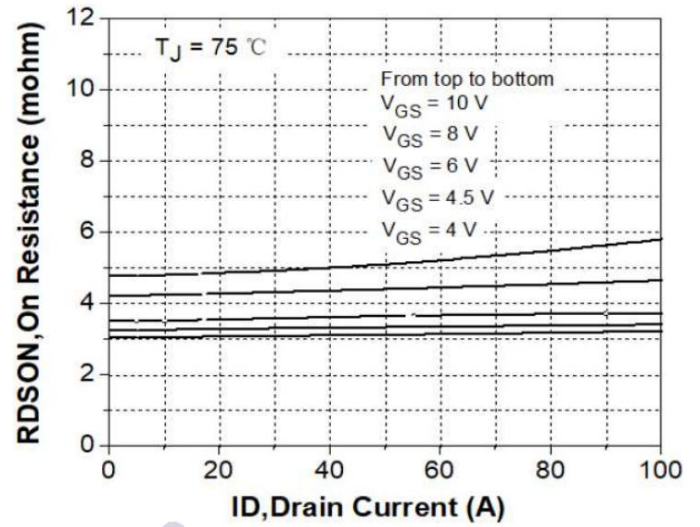


Fig9. Static Drain - Source On - State Resistance vs. Drain Current @Tj= 125 °C

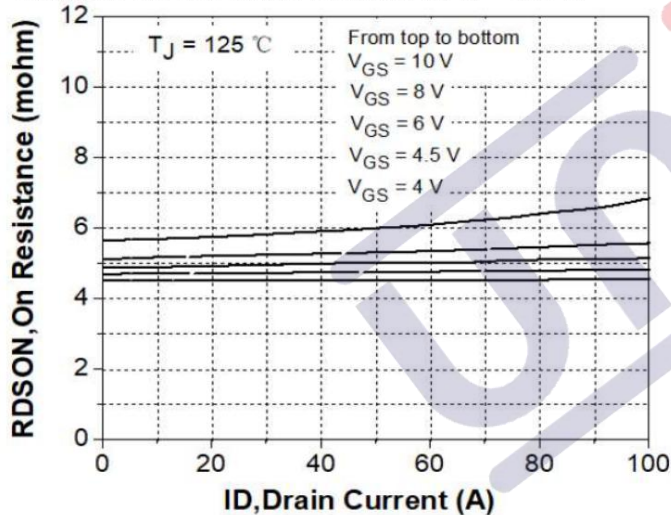


Fig10. Gate Charge Characteristics

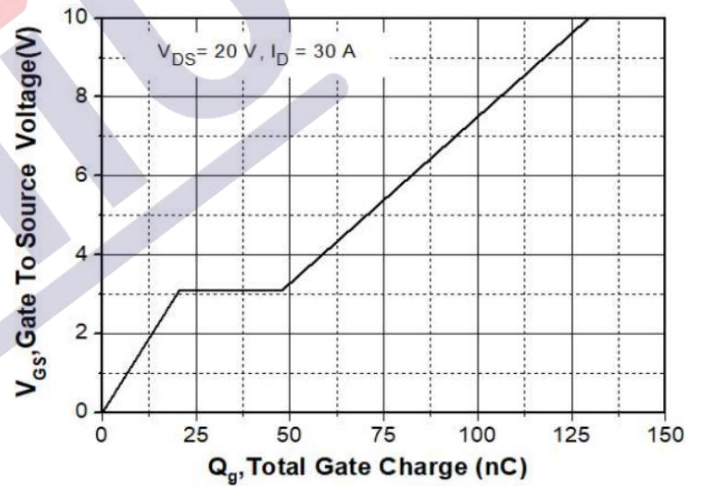


Fig11. Breakdown Voltage vs. Junction Temperature

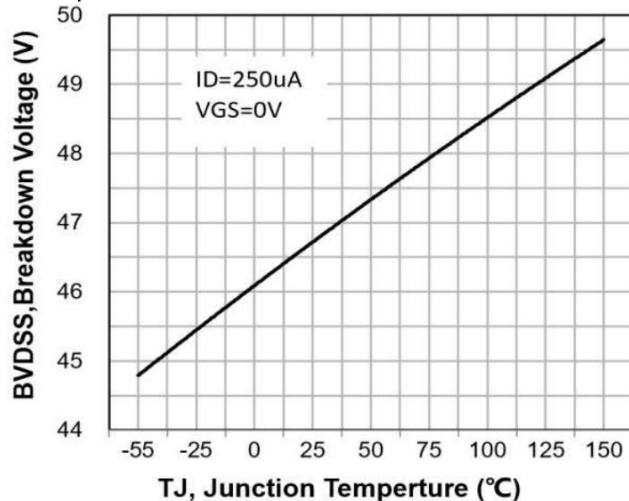


Fig12. Gate Threshold Voltage vs. Junction Temperature

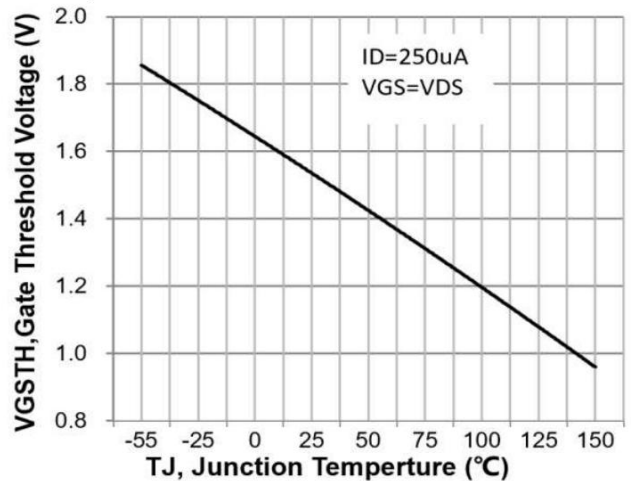


Fig13. Safe Operating Area

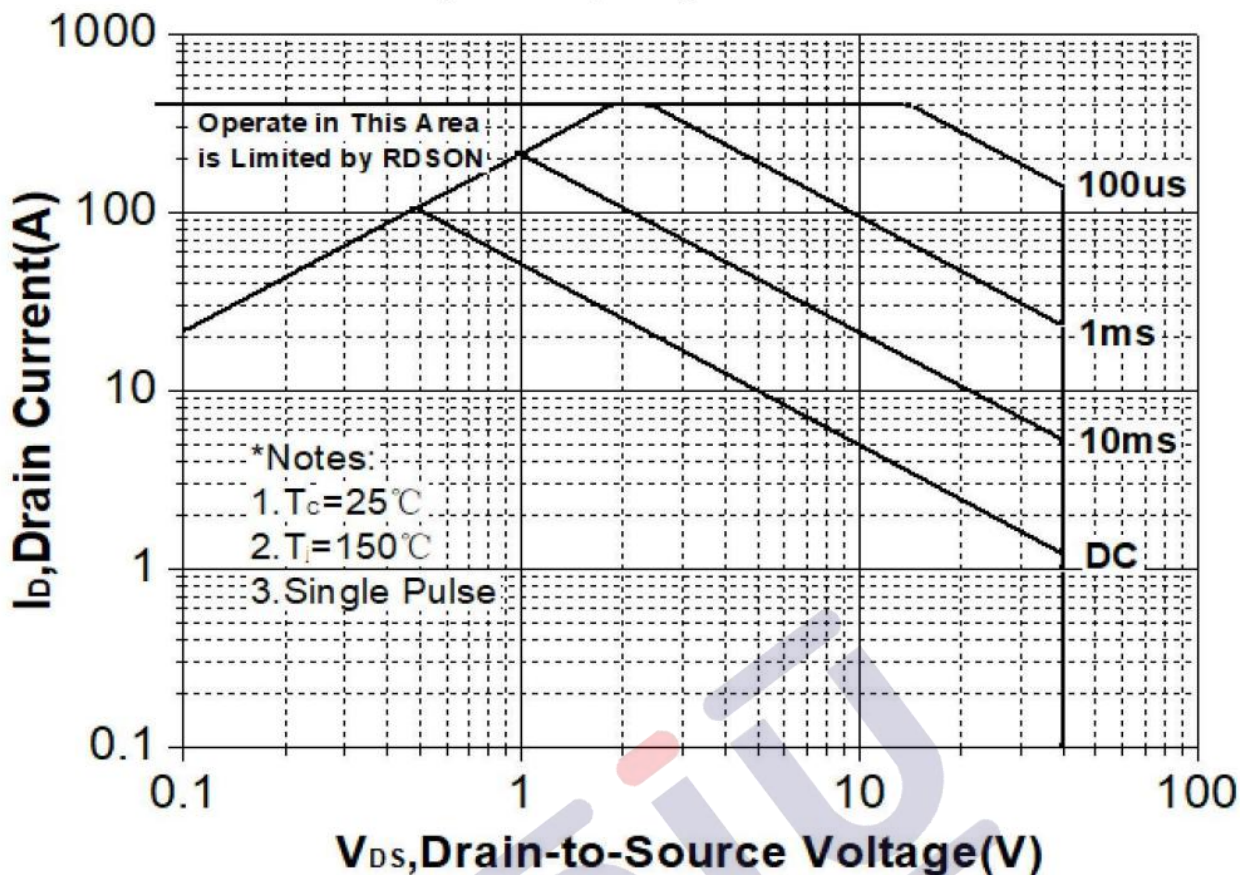


Fig14. Transient Thermal Response Curve

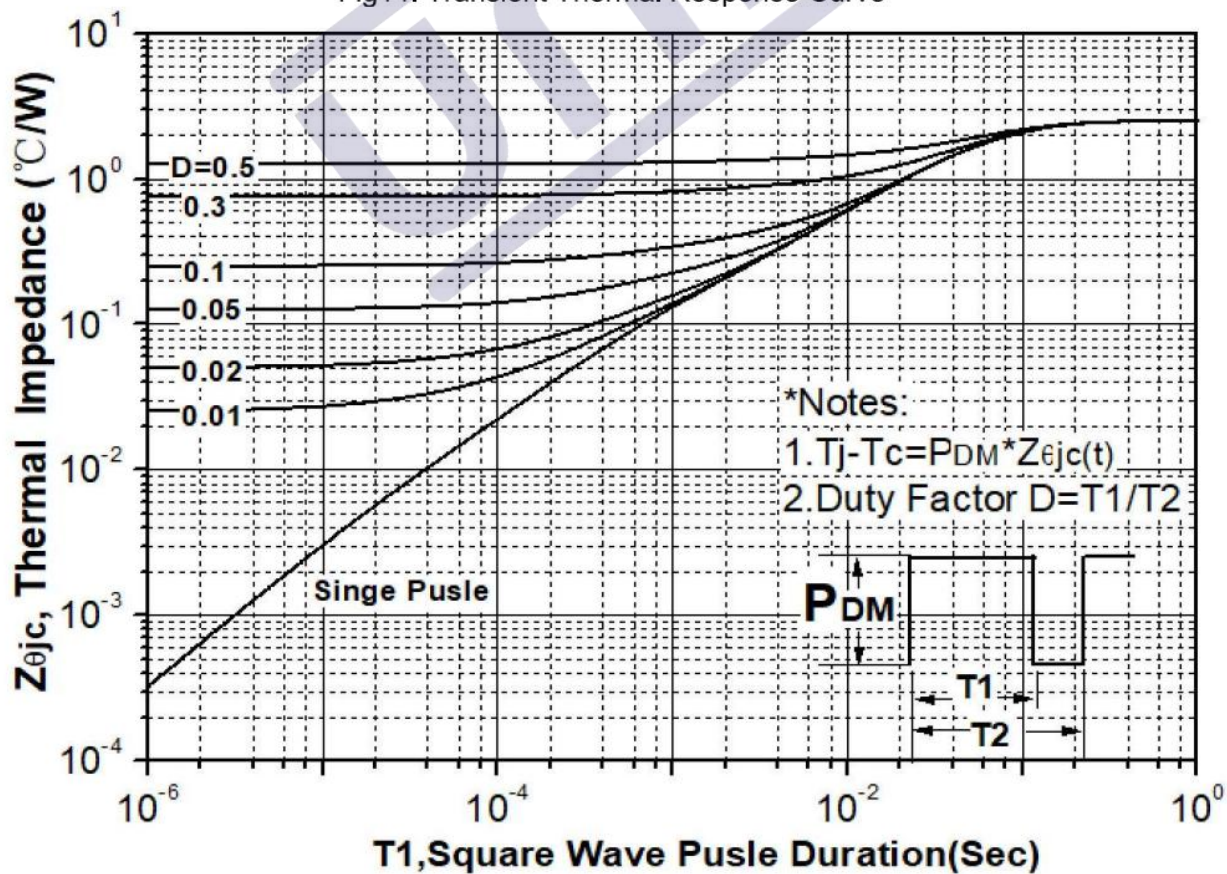


Fig15. On-Resistance Variation vs. Junction

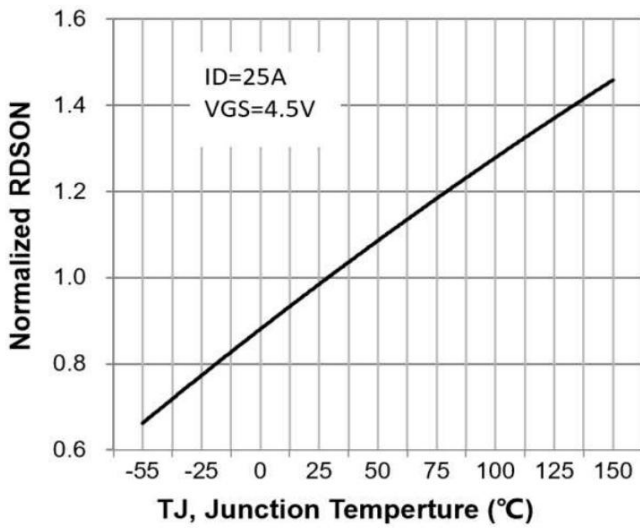


Fig16. Maximum Drain Current vs. Case Temperature

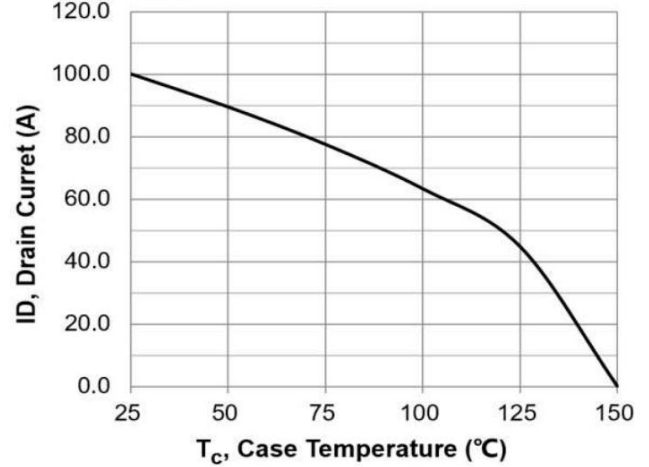


Fig17. Body Diode Forward Voltage vs. Reverse Drain Current

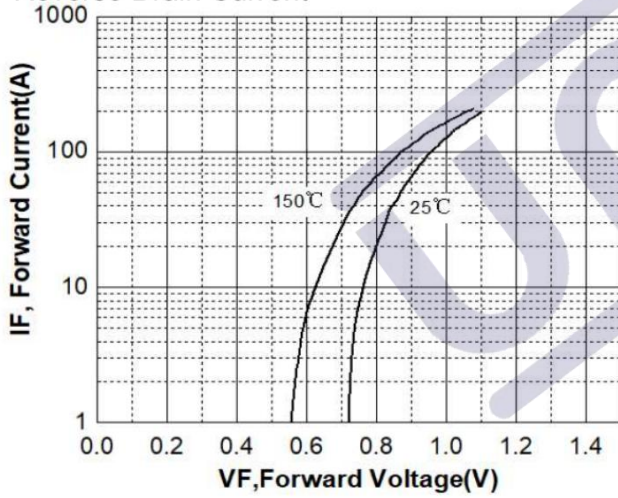
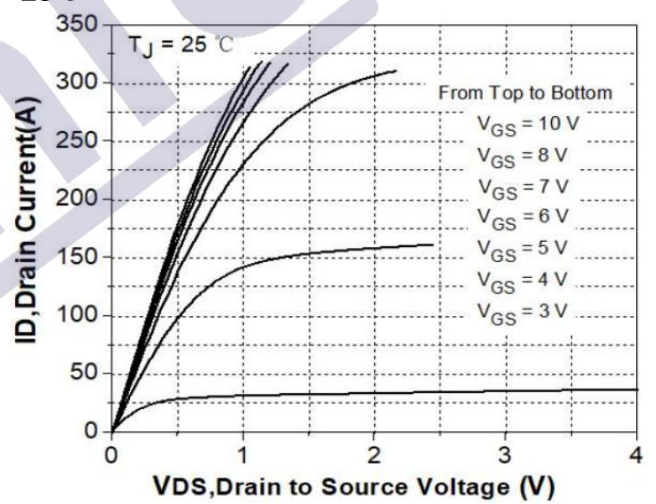
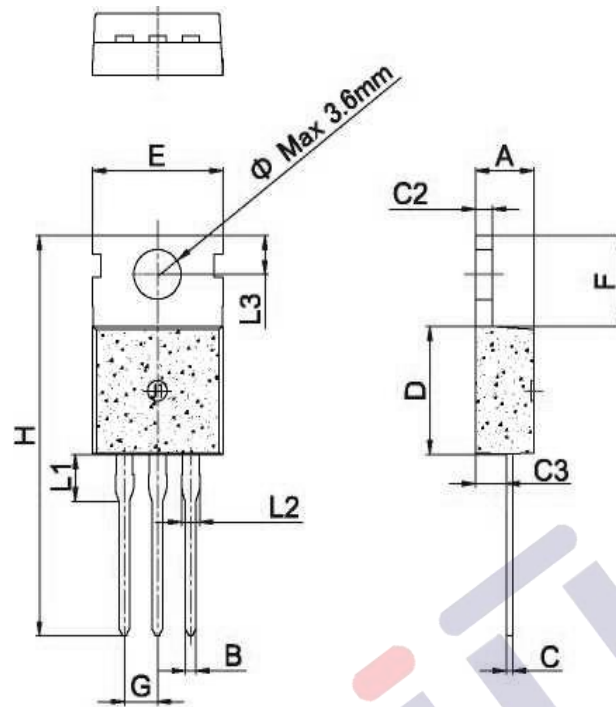


Fig18. Typical Output Characteristics @Tj= 25°C



TO-220C Package Information

TO-220C



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40	—	4.60	0.173	—	0.181
B	0.70	—	0.90	0.028	—	0.035
C	0.45	—	0.60	0.018	—	0.024
C2	1.23	—	1.32	0.048	—	0.052
C3	2.20	—	2.60	0.087	—	0.102
D	8.90	—	9.90	0.350	—	0.390
E	9.90	—	10.3	0.390	—	0.406
F	6.30	—	6.90	0.248	—	0.272
G	—	2.54	—	—	0.1	—
H	28.0	—	29.8	1.102	—	1.173
L1	—	3.39	—	—	0.133	—
L2	1.14	—	1.70	0.045	—	0.067
L3	2.65	—	2.95	0.104	—	0.116
e	—	3.6	—	—	0.142	—

1.版本记录

DATE	REV.	DESCRIPTION
2018/08/19	1.0	First Release

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