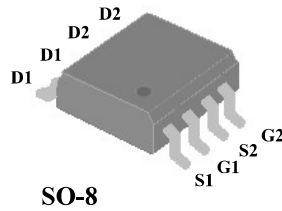


AP4616

N+P-Channel Power MOSFET

- ▼ Simple Drive Requirement
- ▼ Low Gate Charge
- ▼ Fast Switching Performance
- ▼ RoHS Compliant & Halogen-Free

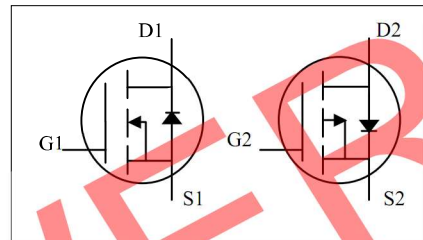


N-CH	BV_{DSS}	30V
	$R_{DS(ON)}$	13.5m Ω
	I_D^3	9.8A
P-CH	BV_{DSS}	-30V
	$R_{DS(ON)}$	23m Ω
	I_D^3	-7.6A

Description

AP4616 series are from Advanced Power innovated design and silicon process technology to achieve the lowest possible on-resistance and fast switching performance. It provides the designer with an extreme efficient device for use in a wide range of power applications.

The SO-8 package is widely preferred for all commercial-industrial surface mount applications using infrared reflow technique and suited for voltage conversion or switch applications.



Absolute Maximum Ratings@ $T_J=25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Rating		Units
		N-channel	P-channel	
V_{DS}	Drain-Source Voltage	30	-30	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
$I_D@T_A=25^\circ\text{C}$	Drain Current, $V_{GS} @ 10V^3$	9.8	-7.6	A
$I_D@T_A=70^\circ\text{C}$	Drain Current, $V_{GS} @ 10V^3$	7.8	-6	A
I_{DM}	Pulsed Drain Current ¹	40	-30	A
$P_D@T_A=25^\circ\text{C}$	Total Power Dissipation	2		W
T_{STG}	Storage Temperature Range	-55 to 150		$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150		$^\circ\text{C}$

Thermal Data

Symbol	Parameter	Value	Unit
Rthj-a	Maximum Thermal Resistance, Junction-ambient ³	62.5	$^\circ\text{C}/\text{W}$

N+P-Channel Power MOSFET

N-CH Electrical Characteristics@T_j=25°C(unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	30	-	-	V
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =9A	-	-	13.5	mΩ
		V _{GS} =4.5V, I _D =5A	-	-	21	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250uA	1	-	3	V
g _{fs}	Forward Transconductance	V _{DS} =5V, I _D =9A	-	27	-	S
I _{DSS}	Drain-Source Leakage Current	V _{DS} =24V, V _{GS} =0V	-	-	10	uA
I _{GSS}	Gate-Source Leakage	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
Q _g	Total Gate Charge	I _D =5A	-	17	27.2	nC
Q _{gs}	Gate-Source Charge	V _{DS} =15V	-	5	-	nC
Q _{gd}	Gate-Drain ("Miller") Charge	V _{GS} =4.5V	-	6.5	-	nC
t _{d(on)}	Turn-on Delay Time	V _{DS} =15V	-	10	-	ns
t _r	Rise Time	I _D =1A	-	9	-	ns
t _{d(off)}	Turn-off Delay Time	R _G =3.3Ω	-	29	-	ns
t _f	Fall Time	V _{GS} =10V	-	7	-	ns
C _{iss}	Input Capacitance	V _{GS} =0V	-	1750	2800	pF
C _{oss}	Output Capacitance	V _{DS} =25V	-	150	-	pF
C _{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	120	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V _{SD}	Forward On Voltage ²	I _S =1.5A, V _{GS} =0V	-	-	1.2	V
t _{rr}	Reverse Recovery Time	I _S =9A, V _{GS} =0V	-	13	-	ns
Q _{rr}	Reverse Recovery Charge	dI/dt=100A/μs	-	4.5	-	nC

N+P-Channel Power MOSFET

P-CH Electrical Characteristics@T_j=25°C(unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250uA	-30	-	-	V
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =-10V, I _D =-7A	-	-	21	mΩ
		V _{GS} =-4.5V, I _D =-4A	-	-	32	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250uA	-1	-	-3	V
g _{fs}	Forward Transconductance	V _{DS} =-5V, I _D =-7A	-	20	-	S
I _{DSS}	Drain-Source Leakage Current	V _{DS} =-24V, V _{GS} =0V	-	-	-10	uA
I _{GSS}	Gate-Source Leakage	V _{GS} =+20V, V _{DS} =0V	-	-	±100	nA
Q _g	Total Gate Charge	I _D =-4A	-	26	41.6	nC
Q _{gs}	Gate-Source Charge	V _{DS} =-15V	-	6.5	-	nC
Q _{gd}	Gate-Drain ("Miller") Charge	V _{GS} =-4.5V	-	9	-	nC
t _{d(on)}	Turn-on Delay Time	V _{DS} =-15V	-	13	-	ns
t _r	Rise Time	I _D =-1A	-	11	-	ns
t _{d(off)}	Turn-off Delay Time	R _G =3.3Ω	-	74	-	ns
t _f	Fall Time	V _{GS} =-10V	-	35	-	ns
C _{iss}	Input Capacitance	V _{GS} =0V	-	2800	4480	pF
C _{oss}	Output Capacitance	V _{DS} =-25V	-	240	-	pF
C _{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	180	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V _{SD}	Forward On Voltage ²	I _S =-1.5A, V _{GS} =0V	-	-	-1.2	V
t _{rr}	Reverse Recovery Time	I _S =-7A, V _{GS} =0V	-	19	-	ns
Q _{rr}	Reverse Recovery Charge	di/dt=-100A/μs	-	10	-	nC

Notes:

- 1.Pulse width limited by Max. junction temperature.
- 2.Pulse test
- 3.Surface mounted on 1 in² copper pad of FR4 board, t ≤10sec ; 135 °C/W when mounted on Min. copper pad.

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N+P-Channel Power MOSFET

N-Channel

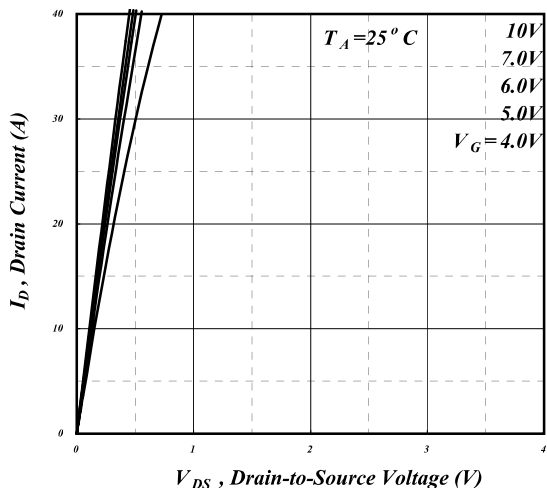


Fig 1. Typical Output Characteristics

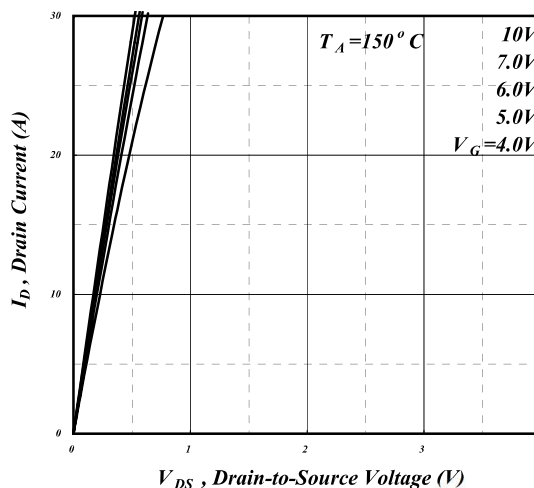


Fig 2. Typical Output Characteristics

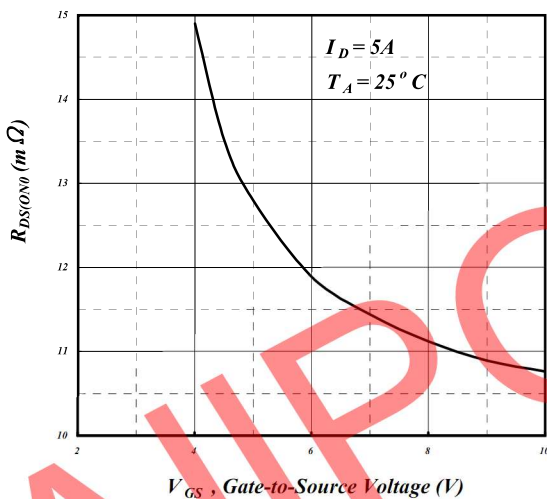


Fig 3. On-Resistance v.s. Gate Voltage

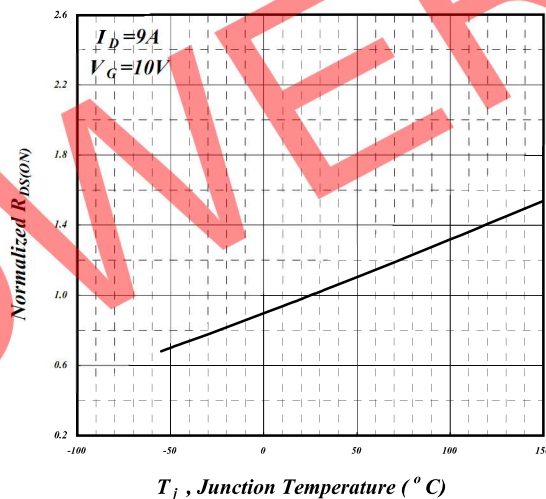


Fig 4. Normalized On-Resistance v.s. Junction Temperature

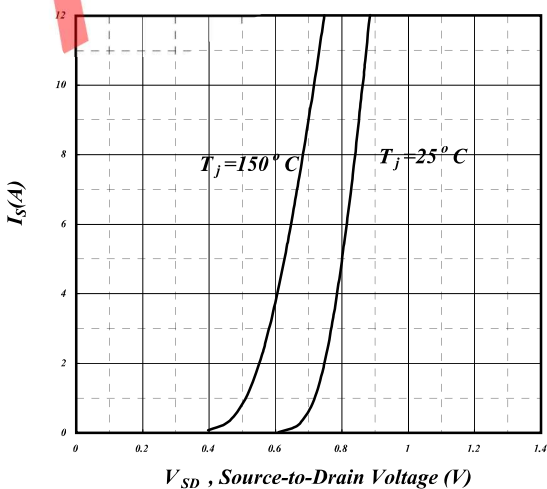


Fig 5. Forward Characteristic of Reverse Diode

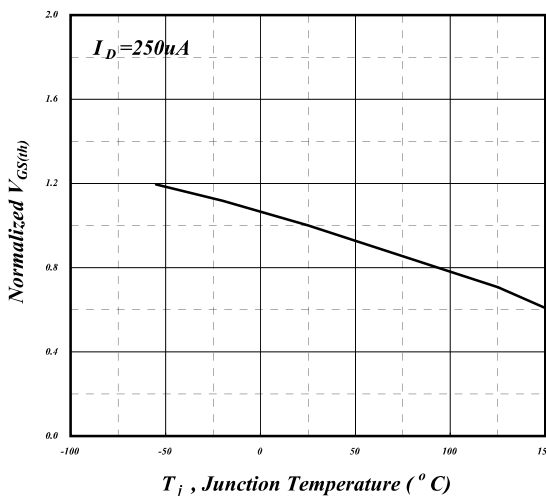


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

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N+P-Channel Power MOSFET

N-Channel

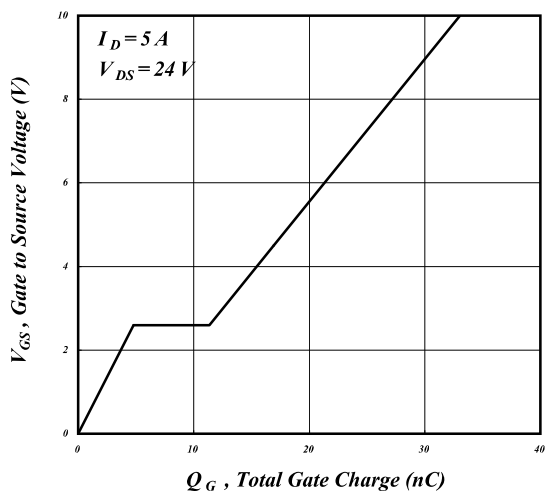


Fig 7. Gate Charge Characteristics

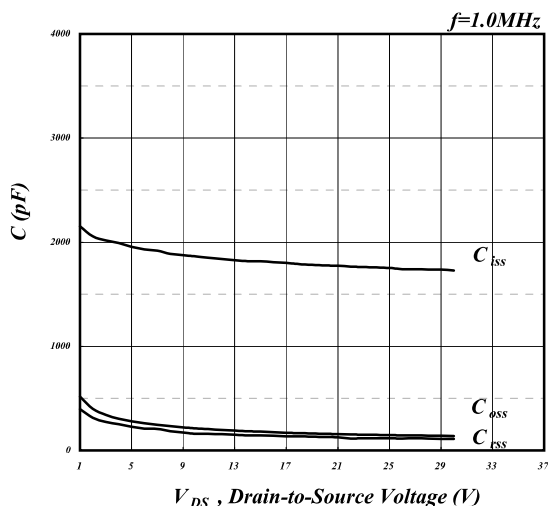


Fig 8. Typical Capacitance Characteristics

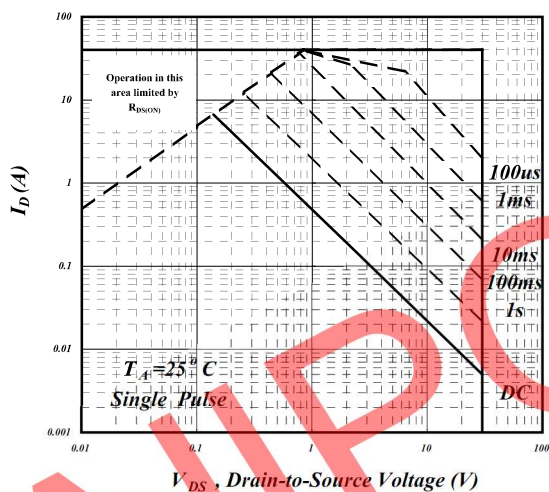


Fig 9. Maximum Safe Operating Area

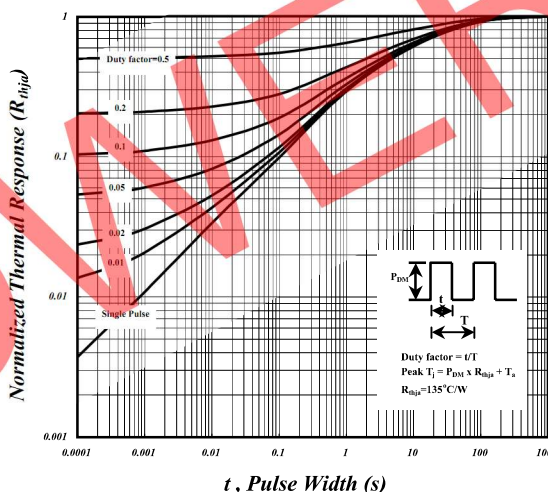


Fig 10. Effective Transient Thermal Impedance

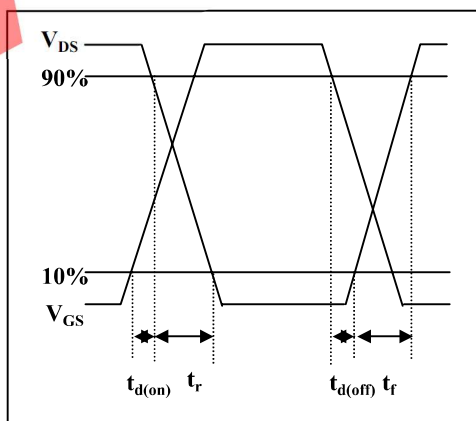


Fig 11. Switching Time Waveform

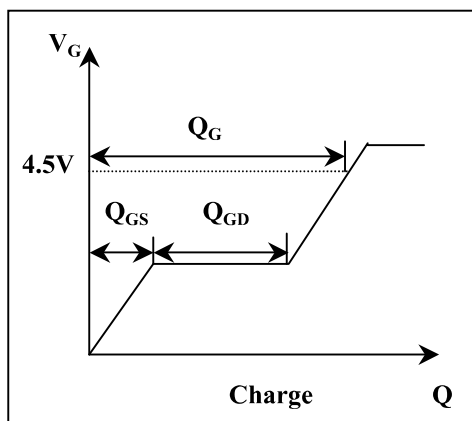


Fig 12. Gate Charge Waveform

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N+P-Channel Power MOSFET

N-Channel

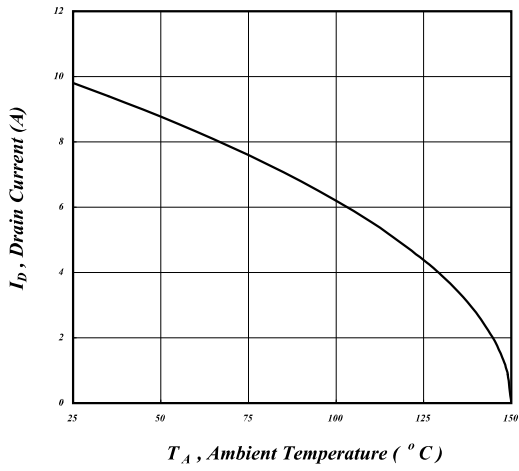


Fig 13. Drain Current v.s. Ambient Temperature

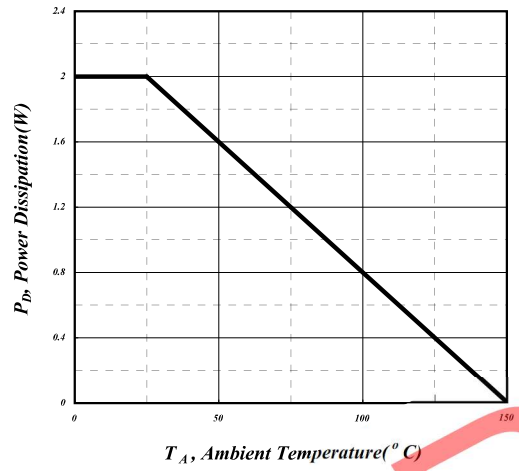


Fig 14. Total Power Dissipation

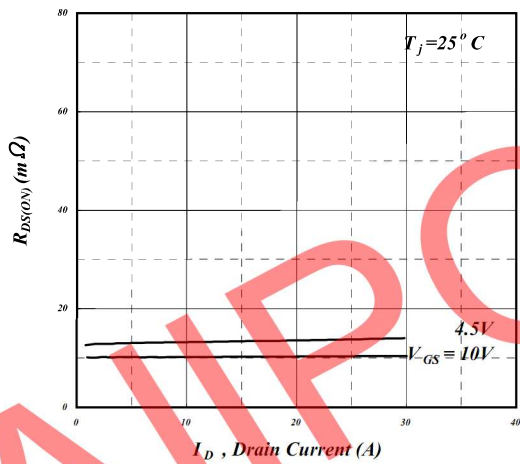


Fig 15. Typ. Drain-Source on State Resistance

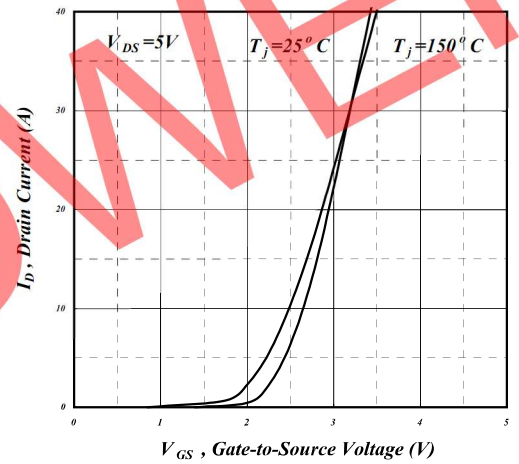


Fig 16. Transfer Characteristics

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N+P-Channel Power MOSFET

P-Channel

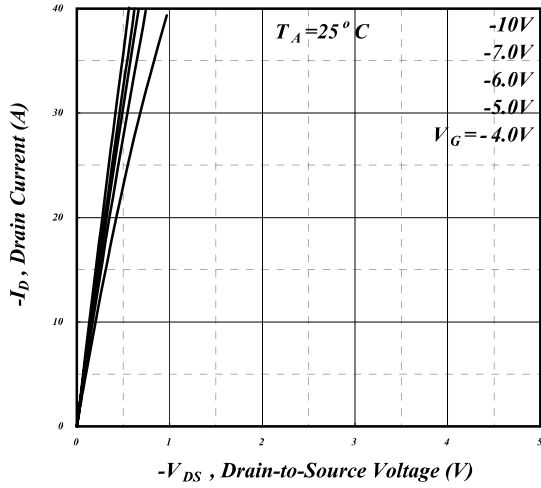


Fig 1. Typical Output Characteristics

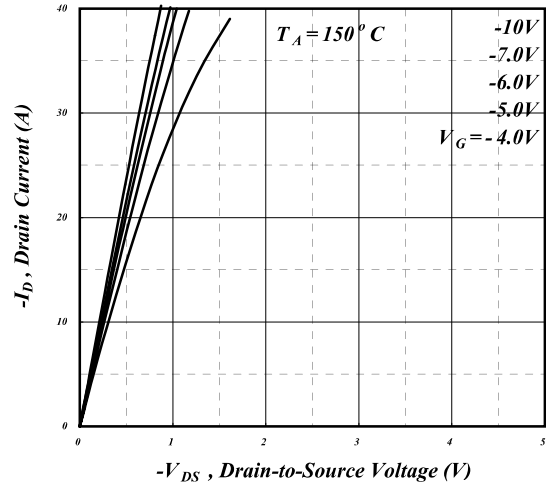


Fig 2. Typical Output Characteristics

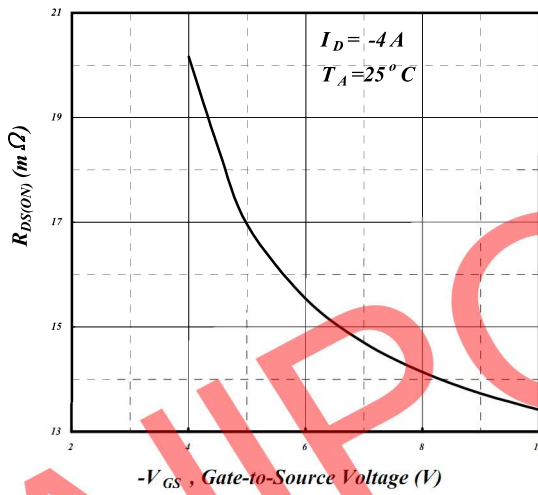


Fig 3. On-Resistance v.s. Gate Voltage

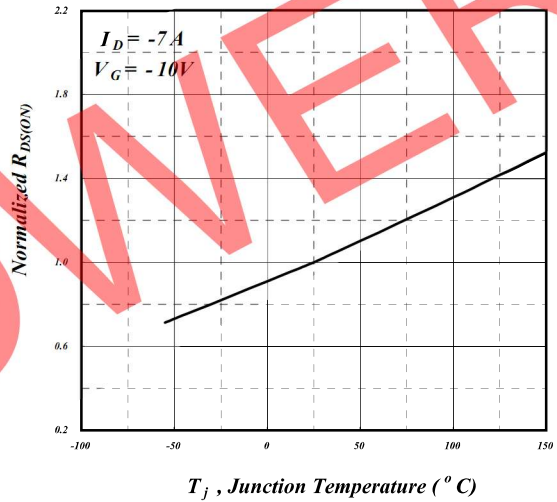


Fig 4. Normalized On-Resistance v.s. Junction Temperature

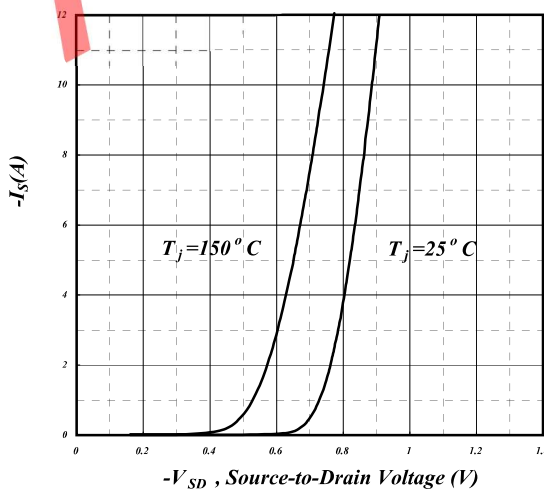


Fig 5. Forward Characteristic of Reverse Diode

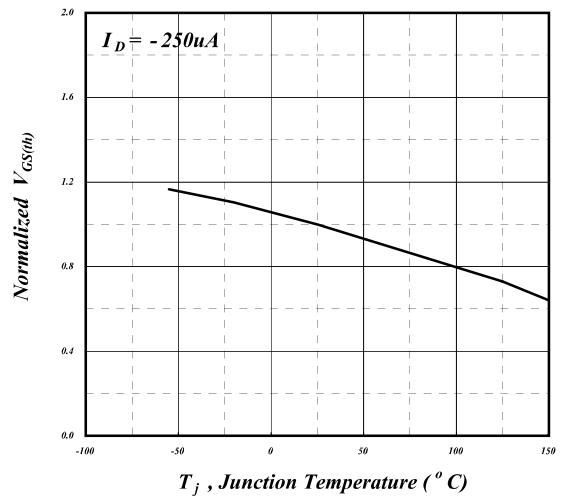


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

AP4616
N+P-Channel Power MOSFET

P-Channel

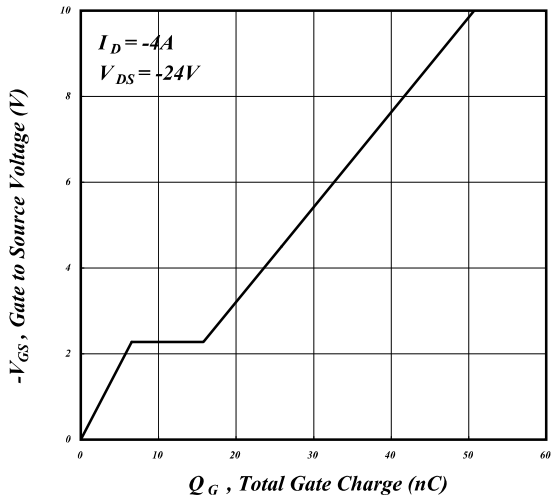


Fig 7. Gate Charge Characteristics

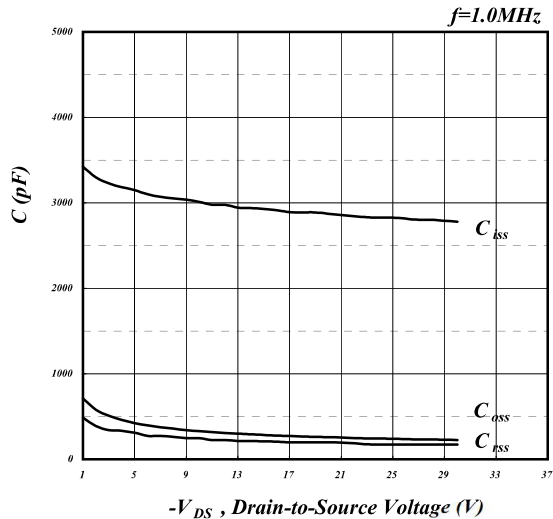


Fig 8. Typical Capacitance Characteristics

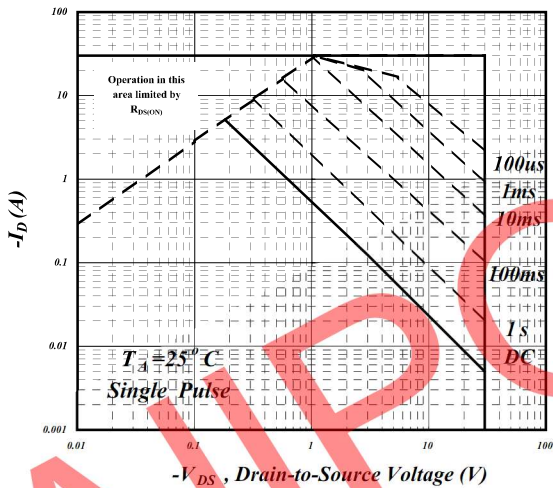


Fig 9. Maximum Safe Operating Area

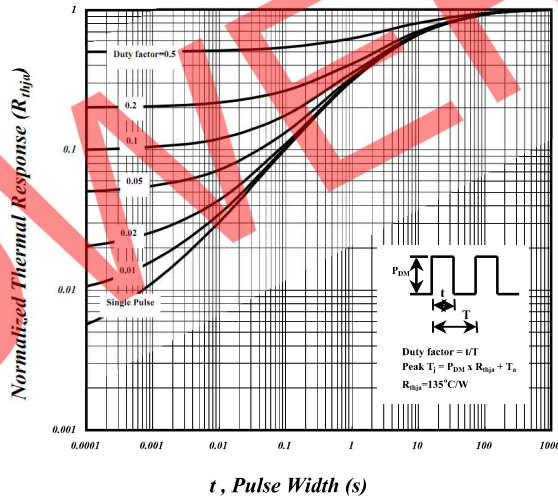


Fig 10. Effective Transient Thermal Impedance

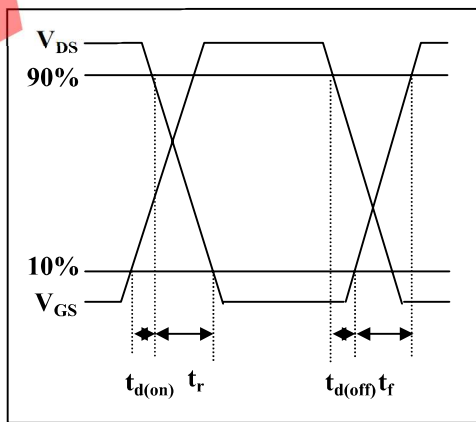


Fig 11. Switching Time Waveform

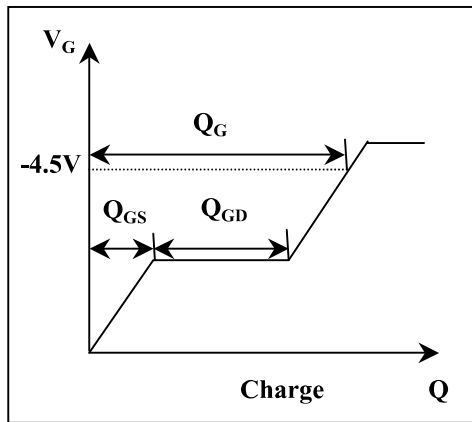


Fig 12. Gate Charge Waveform

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N+P-Channel Power MOSFET

P-Channel

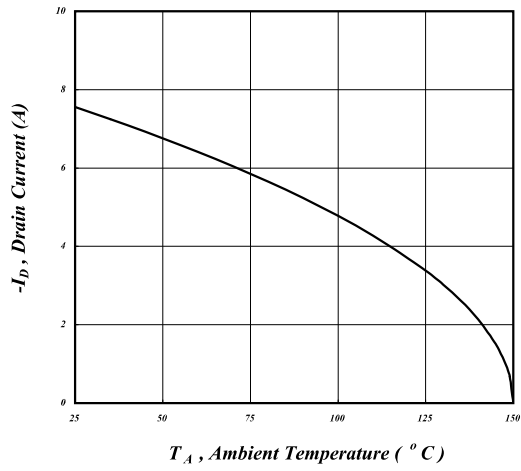


Fig 13. Drain Current v.s. Ambient Temperature

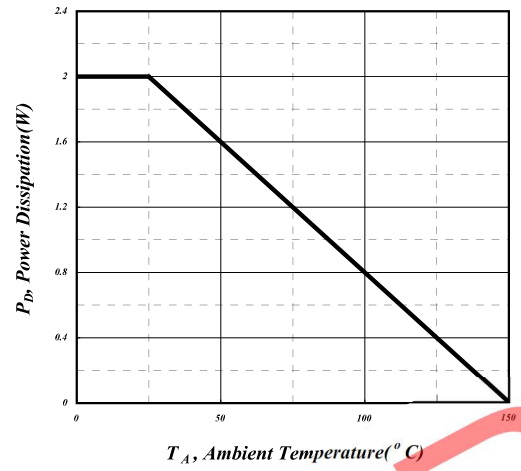


Fig 14. Total Power Dissipation

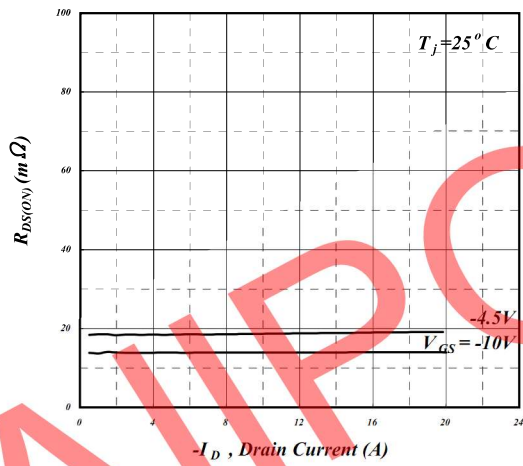


Fig 15. Typ. Drain-Source on State Resistance

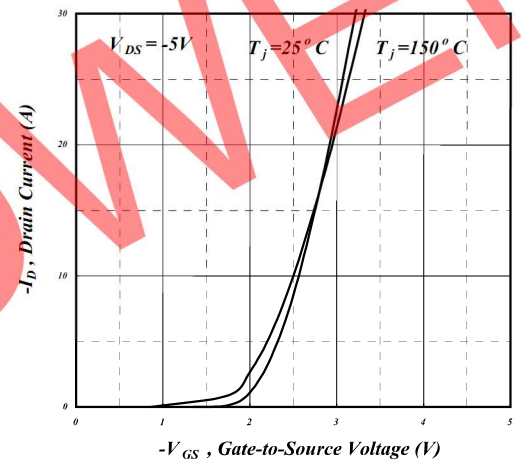


Fig 16. Transfer Characteristics