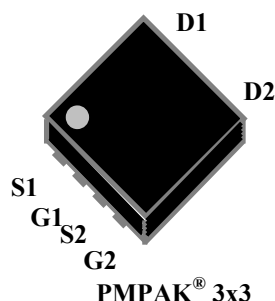


- ▼ Simple Drive Requirement
- ▼ Good Thermal Performance
- ▼ Fast Switching Performance
- ▼ RoHS Compliant & Halogen-Free

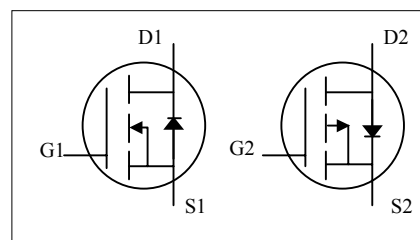


Description

XP3C020A series are 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 PMPAK[®] 3x3 package is special for voltage conversion application using standard infrared reflow technique with the backside heat sink to achieve the good thermal performance.

N-CH	BV_{DSS}	30V
	$R_{DS(ON)}$	20m Ω
	I_D^3	8.9A
P-CH	BV_{DSS}	-30V
	$R_{DS(ON)}$	45m Ω
	I_D^3	-6.1A



Absolute Maximum Ratings@T_j=25°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
$I_D@T_A=25^\circ C$	Drain Current ³ , V_{GS} @ 10V	8.9	-6.1	A
$I_D@T_A=70^\circ C$	Drain Current ³ , V_{GS} @ 10V	7.1	-4.9	A
I_{DM}	Pulsed Drain Current ¹	20	-20	A
$P_D@T_A=25^\circ C$	Total Power Dissipation	2.5		W
I_{AS}	Avalanche Current ⁴	12	-12	A
E_{AS}	Single Pulse Avalanche Energy ⁴	7.2		mJ
T_{STG}	Storage Temperature Range	-55 to 150		°C
T_J	Operating Junction Temperature Range	-55 to 150		°C

Thermal Data

Symbol	Parameter	Value	Unit
Rthj-c	Maximum Thermal Resistance, Junction-case	8	°C/W
Rthj-a	Maximum Thermal Resistance, Junction-ambient ³	50	°C/W

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 =250μA	30	-	-	V
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =8A	-	-	20	mΩ
		V _{GS} =4.5V, I _D =4A	-	-	35	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =1mA	1.4	-	2.5	V
g _{fs}	Forward Transconductance	V _{DS} =5V, I _D =8A	-	23	-	S
I _{DSS}	Drain-Source Leakage Current	V _{DS} =24V, V _{GS} =0V	-	-	10	μA
I _{GSS}	Gate-Source Leakage	V _{GS} =±20V, V _{DS} =0V	-	-	±0.1	μA
Q _g (V _{GS} =10V)	Total Gate Charge ⁵	I _D =8A V _{DS} =15V	-	12	20	nC
Q _g (V _{GS} =4.5V)	Total Gate Charge ⁵		-	6	10	nC
Q _{gs}	Gate-Source Charge ⁵		-	2	-	nC
Q _{gd}	Gate-Drain ("Miller") Charge ⁵		-	3	-	nC
t _{d(on)}	Turn-on Delay Time ⁵	V _{DS} =15V	-	7	-	ns
t _r	Rise Time ⁵	I _D =1A	-	9	-	ns
t _{d(off)}	Turn-off Delay Time ⁵	R _G =3.3Ω	-	18	-	ns
t _f	Fall Time ⁵	V _{GS} =10V	-	4	-	ns
C _{iss}	Input Capacitance ⁵	V _{GS} =0V	-	500	800	pF
C _{oss}	Output Capacitance ⁵	V _{DS} =15V	-	90	-	pF
C _{rss}	Reverse Transfer Capacitance ⁵	f=1.0MHz	-	80	-	pF
R _g	Gate Resistance	f=1.0MHz	-	2.5	5	Ω

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V _{SD}	Forward On Voltage ²	I _S =2A, V _{GS} =0V	-	-	1.2	V
t _{rr}	Reverse Recovery Time	I _S =8A, V _{GS} =0V dI/dt=100A/μs	-	8	-	ns
Q _{rr}	Reverse Recovery Charge		-	2	-	nC

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
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 =-6A	-	-	45	mΩ
		V _{GS} =-4.5V, I _D =-3A	-	-	85	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250uA	-1	-	-2.5	V
g _{fs}	Forward Transconductance	V _{DS} =-5V, I _D =-6A	-	11	-	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	-	-	±0.1	uA
Q _g (V _{GS} =-10V)	Total Gate Charge ⁵	I _D =-6A V _{DS} =-15V	-	15	24	nC
Q _g (V _{GS} =-4.5V)	Total Gate Charge ⁵		-	7	12	nC
Q _{gs}	Gate-Source Charge ⁵		-	2.5	-	nC
Q _{gd}	Gate-Drain ("Miller") Charge ⁵		-	3	-	nC
t _{d(on)}	Turn-on Delay Time ⁵	V _{DS} =-15V	-	9	-	ns
t _r	Rise Time ⁵	I _D =-1A	-	8	-	ns
t _{d(off)}	Turn-off Delay Time ⁵	R _G =3.3Ω	-	40	-	ns
t _f	Fall Time ⁵	V _{GS} =-10V	-	22	-	ns
C _{iss}	Input Capacitance ⁵	V _{GS} =0V	-	710	1136	pF
C _{oss}	Output Capacitance ⁵	V _{DS} =-15V	-	95	-	pF
C _{rss}	Reverse Transfer Capacitance ⁵	f=1.0MHz	-	80	-	pF
R _g	Gate Resistance	f=1.0MHz	-	11	22	Ω

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{SD}	Forward On Voltage ²	I _S =-2A, V _{GS} =0V	-	-	-1.2	V
t _{rr}	Reverse Recovery Time	I _S =-6A, V _{GS} =0V dI/dt=-100A/μs	-	9.5	-	ns
Q _{rr}	Reverse Recovery Charge		-	4	-	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, 90°C/W at steady state.
- 4.Starting T_J=25°C , V_{DD}=30V , L=0.1mH , R_G=25Ω , V_{GS}=10V
- 5.Guaranteed by design.
- 6.These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T_{J(MAX)}=150°C.

THIS PRODUCT IS SENSITIVE TO ELECTROSTATIC DISCHARGE, PLEASE HANDLE WITH CAUTION.

USE OF THIS PRODUCT AS A CRITICAL COMPONENT IN LIFE SUPPORT, AUTOMOTIVE OR OTHER SIMILAR SYSTEMS IS NOT AUTHORIZED.

YAGEO XSEMI DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

YAGEO XSEMI RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN.

N-Channel

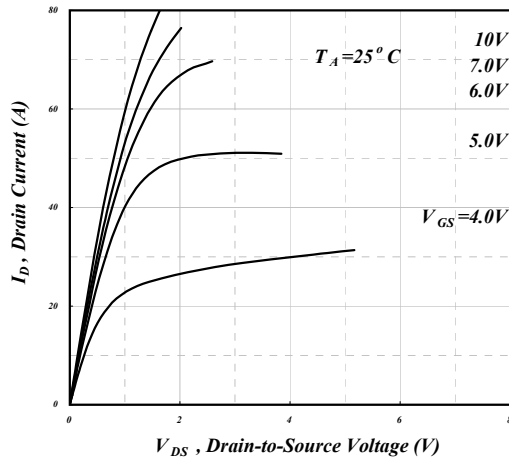


Fig 1. Typical Output Characteristics

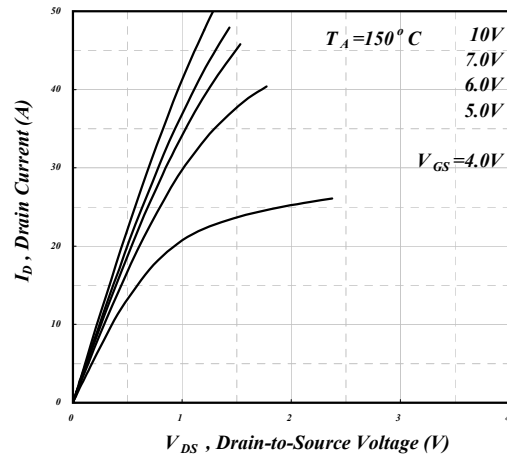


Fig 2. Typical Output Characteristics

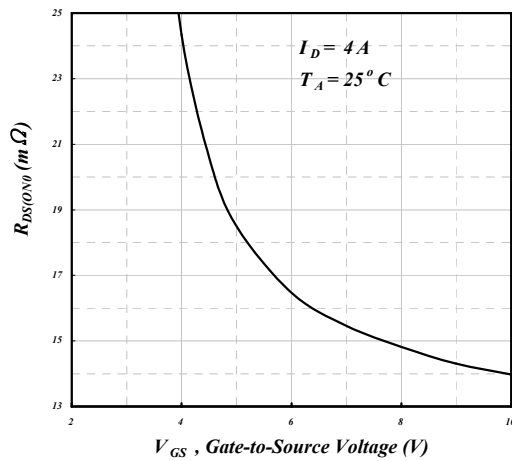


Fig 3. On-Resistance v.s. Gate Voltage

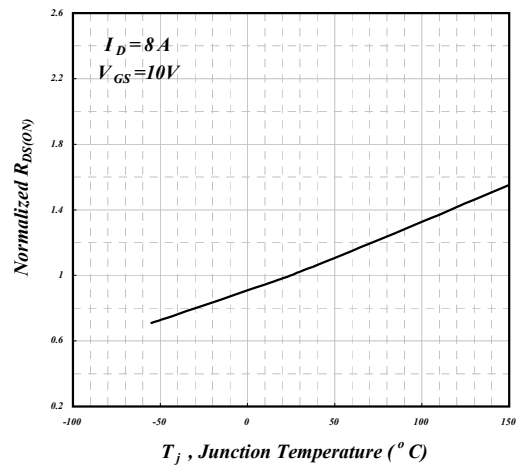


Fig 4. Normalized On-Resistance v.s. Junction Temperature

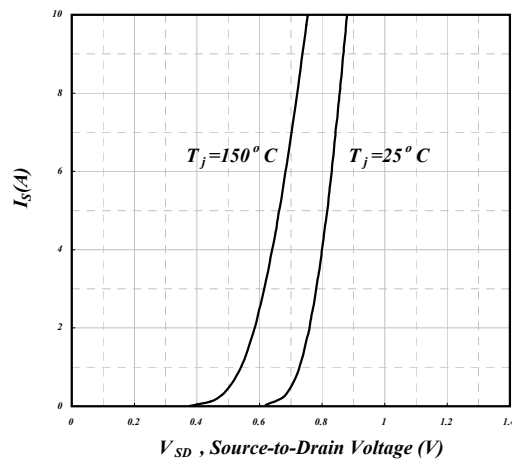


Fig 5. Forward Characteristic of Reverse Diode

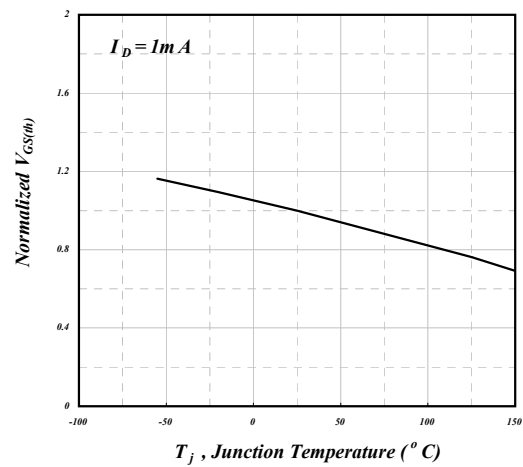


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

N-Channel

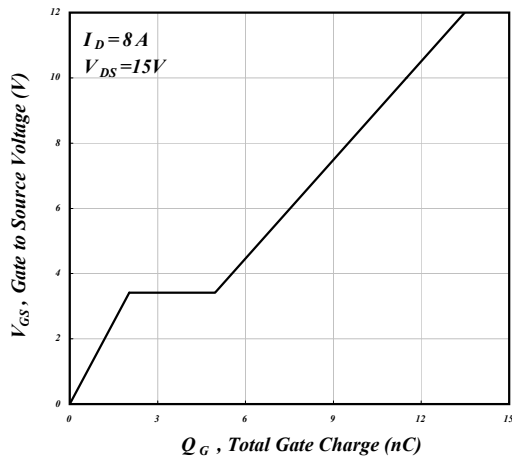


Fig 7. Gate Charge Characteristics

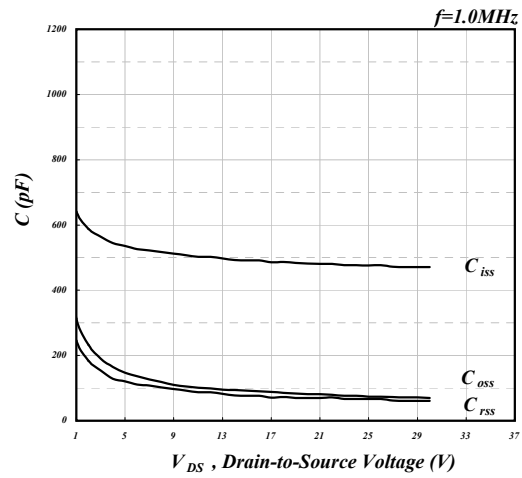


Fig 8. Typical Capacitance Characteristics

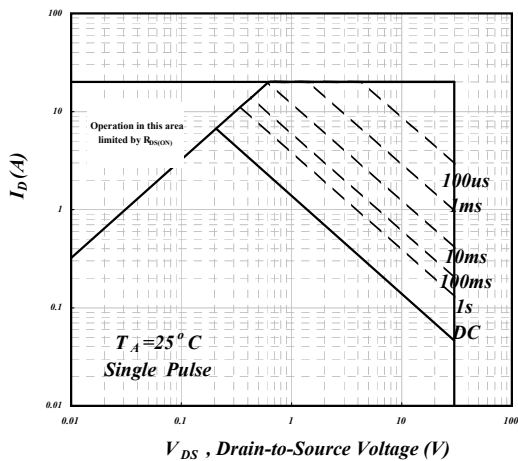


Fig 9. Maximum Safe Operating Area⁶

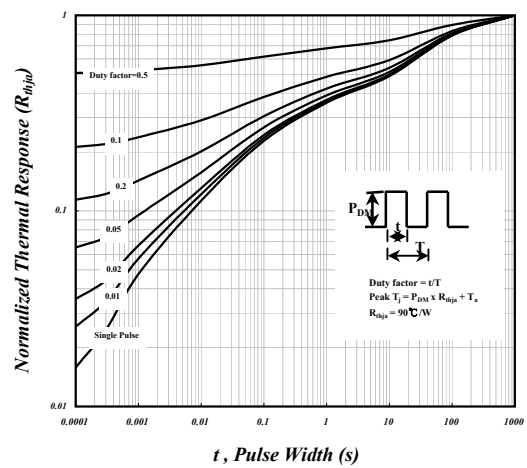


Fig 10. Effective Transient Thermal Impedance

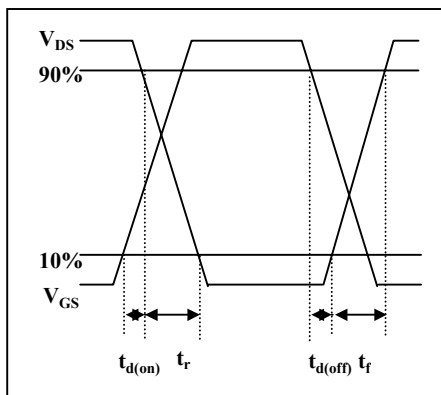


Fig 11. Switching Time Waveform

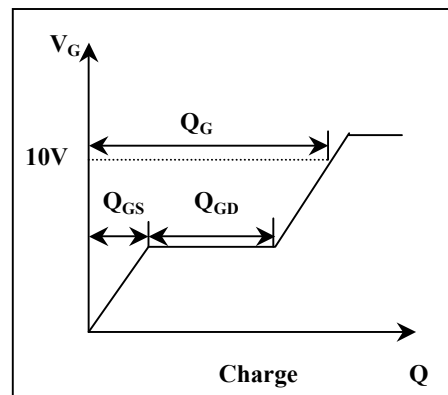


Fig 12. Gate Charge Waveform

N-Channel

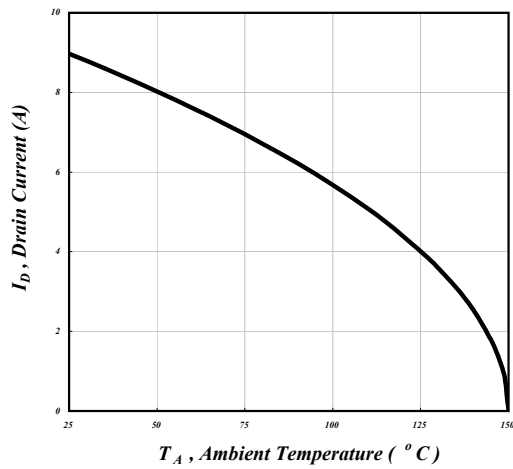


Fig 13. Drain Current v.s. Ambient Temperature

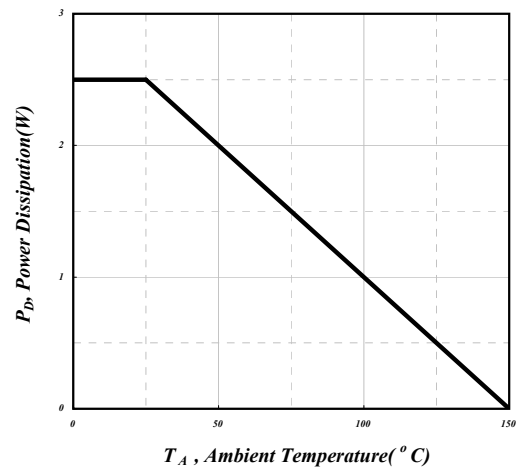


Fig 14. Total Power Dissipation

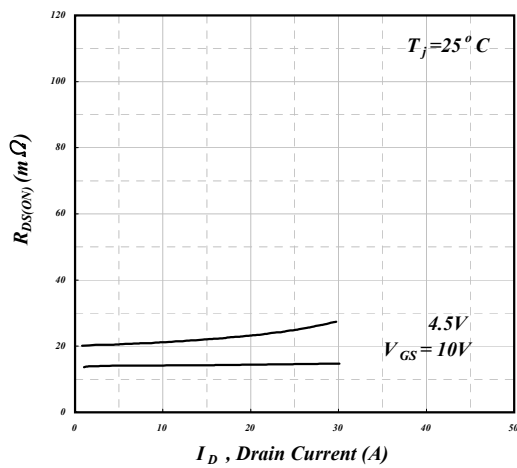


Fig 15. Typ. Drain-Source on State Resistance

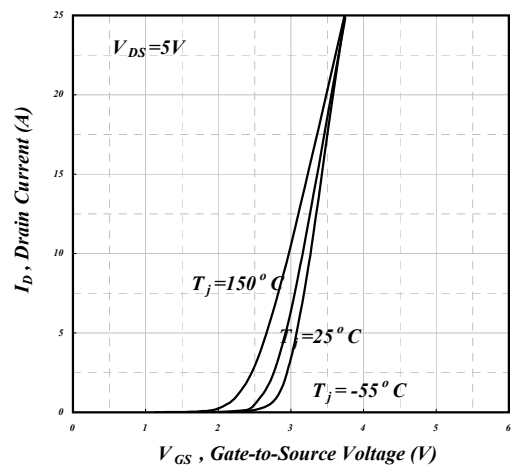


Fig 16. Transfer Characteristics

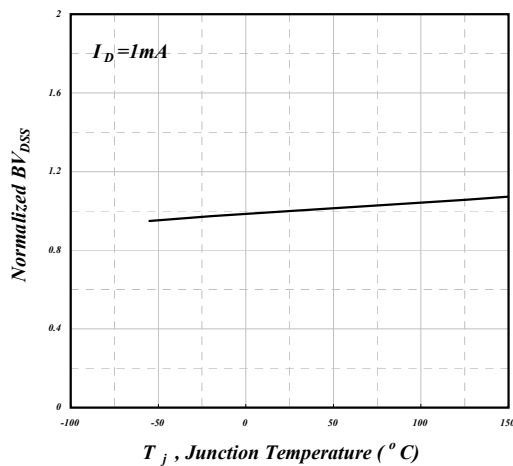


Fig 17. Normalized BV_{DSS} v.s. Junction Temperature

P-Channel

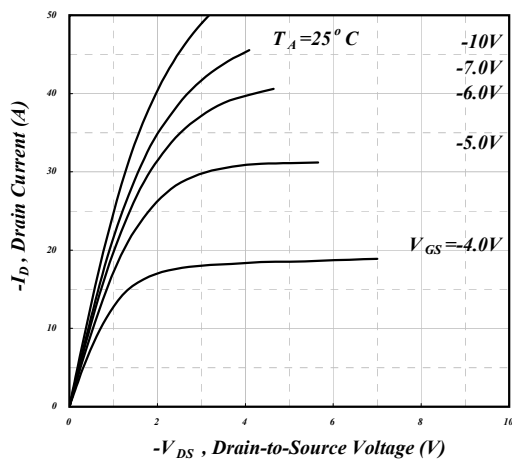


Fig 1. Typical Output Characteristics

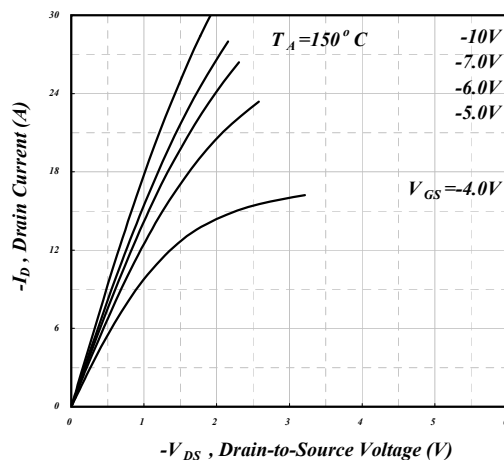


Fig 2. Typical Output Characteristics

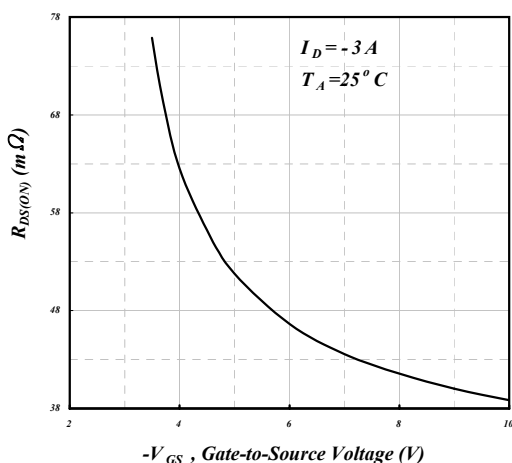


Fig 3. On-Resistance v.s. Gate Voltage

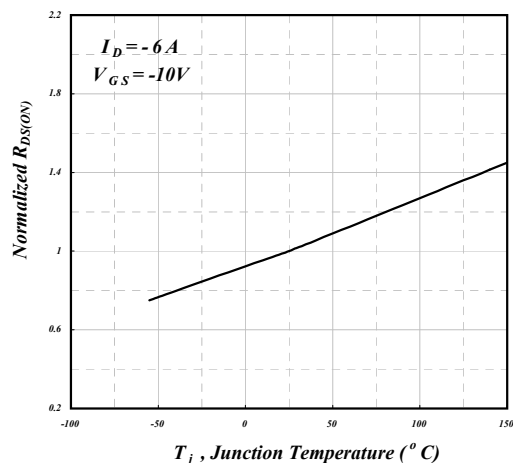


**Fig 4. Normalized On-Resistance
v.s. Junction Temperature**

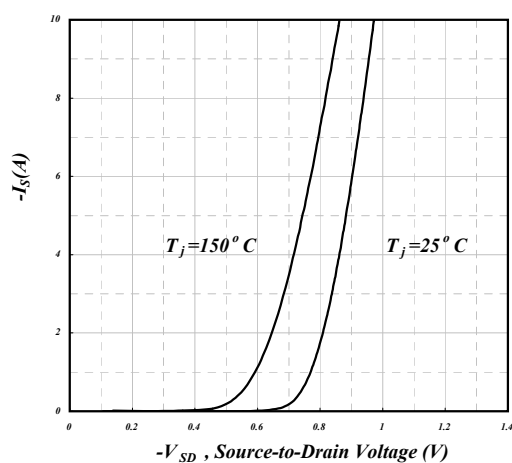


**Fig 5. Forward Characteristic of
Reverse Diode**

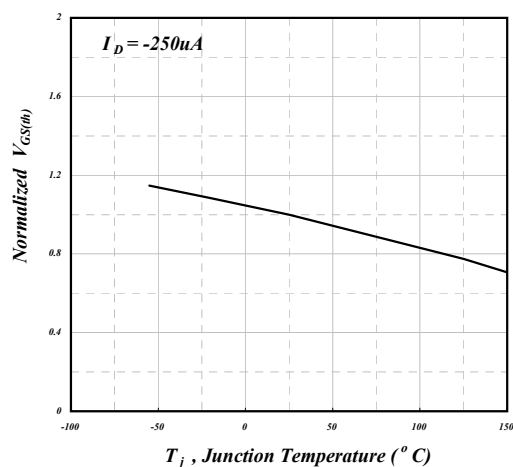


**Fig 6. Gate Threshold Voltage v.s.
Junction Temperature**

P-Channel

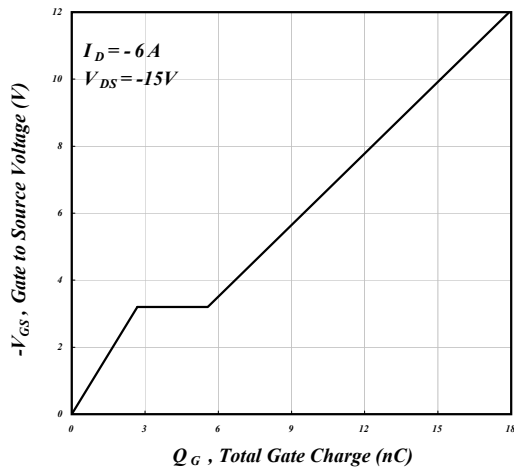


Fig 7. Gate Charge Characteristics

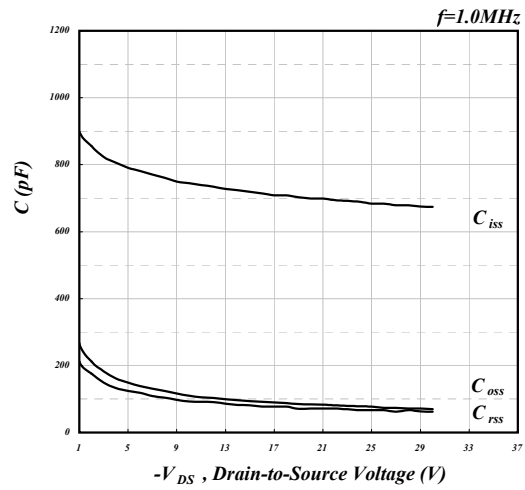


Fig 8. Typical Capacitance Characteristics

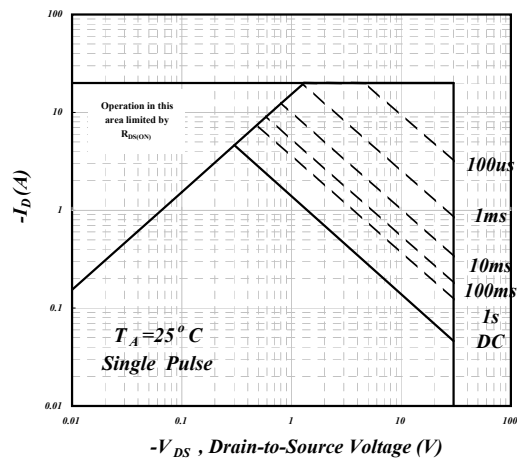


Fig 9. Maximum Safe Operating Area⁶

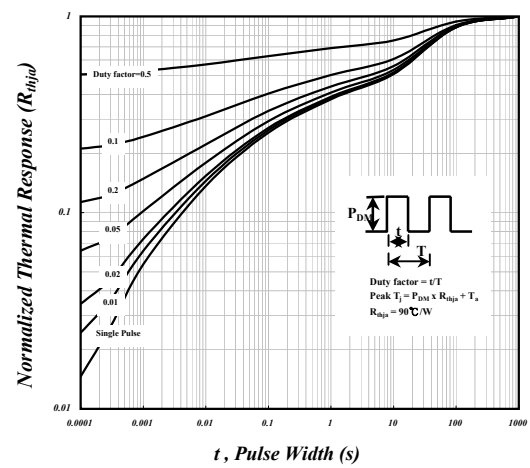


Fig 10. Effective Transient Thermal Impedance

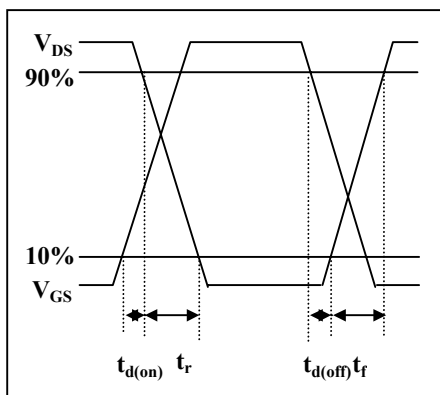


Fig 11. Switching Time Waveform

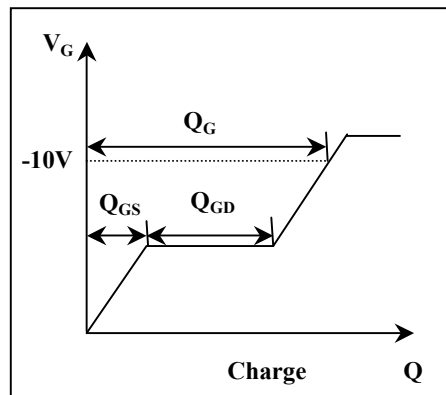


Fig 12. Gate Charge Waveform

P-Channel

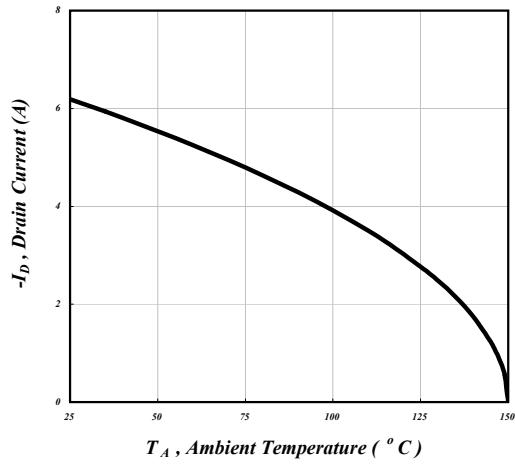


Fig 13. Drain Current v.s. Ambient Temperature

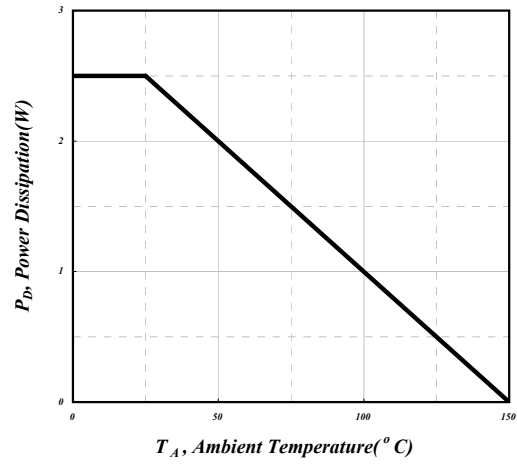


Fig 14. Total Power Dissipation

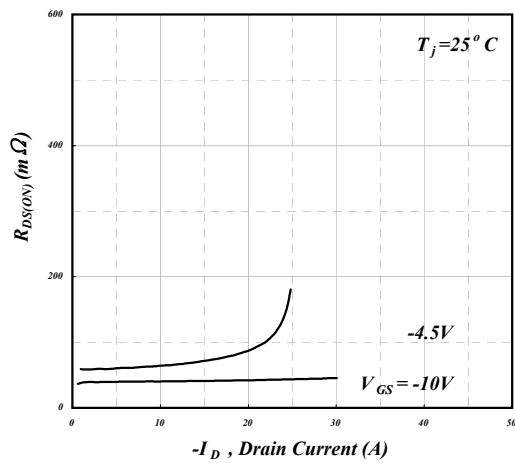


Fig 15. Typ. Drain-Source on State Resistance

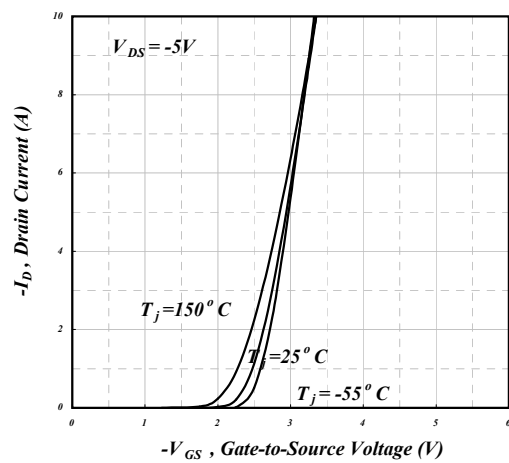


Fig 16. Transfer Characteristics

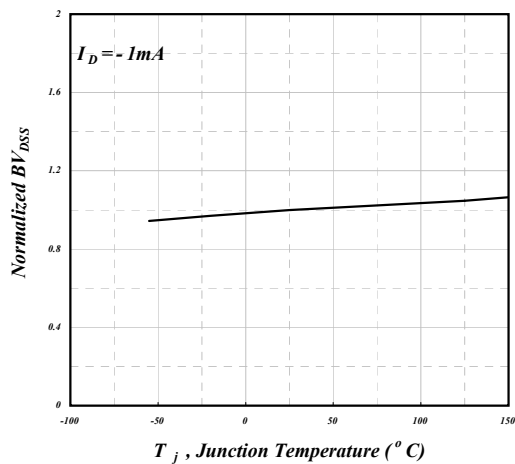
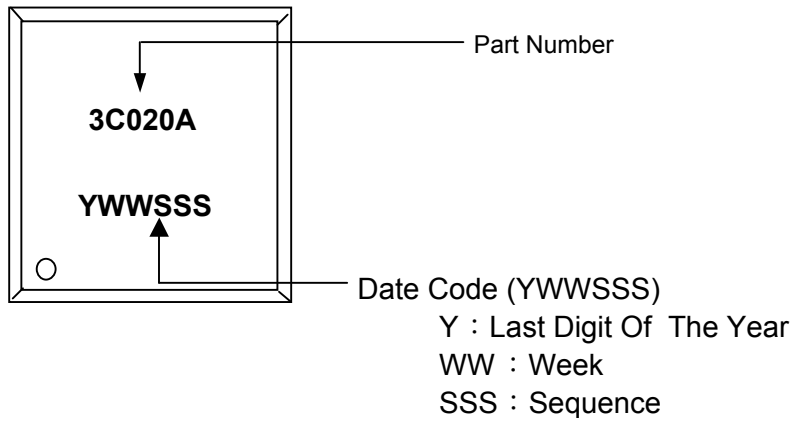
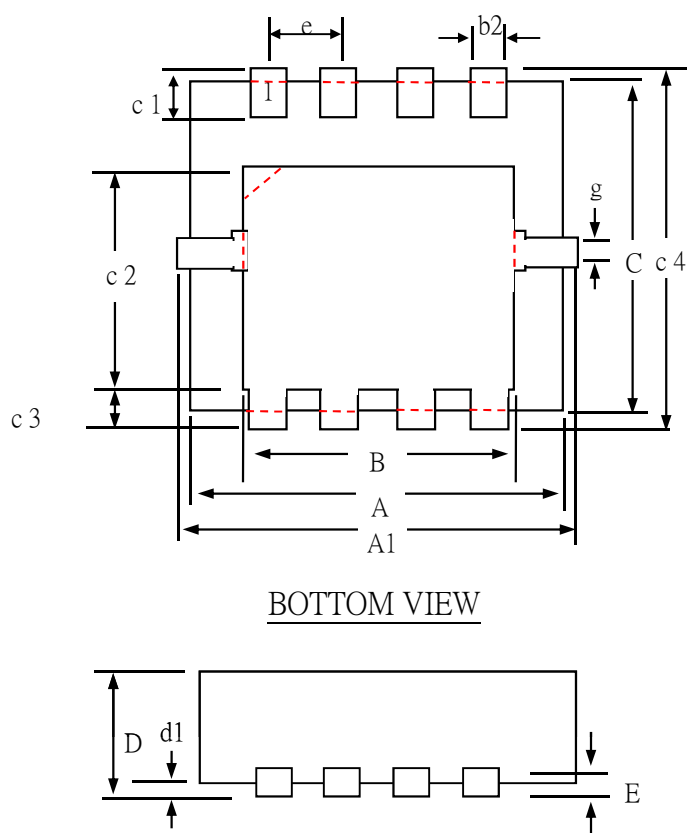


Fig 17. Normalized BV_{DS} v.s. Junction Temperature

MARKING INFORMATION



Package Outline : PMPAK 3x3



BOTTOM VIEW

SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	2.90	3.10	3.40
B	2.20	2.45	2.80
e	0.60	0.65	0.70
b2	0.20	0.30	0.40
C	2.90	3.10	3.40
c1	0.10	0.30	0.50
c2	1.20	1.70	2.20
c3	0.10	0.38	0.65
D	0.65	0.80	1.05
d1	0.00	0.10	0.20
E	0.10	0.18	0.25
A1	2.900	3.30	3.600
c4	2.900	3.30	3.600
g	0.20 (ref)		

- 1.All Dimension Are In Millimeters.
- 2.Dimension Does Not Include Mold Protrusions.
3. Thermal PAD and Pin contour is for reference, it may has little difference by option.

PMPAK3X3 FOOTPRINT :

