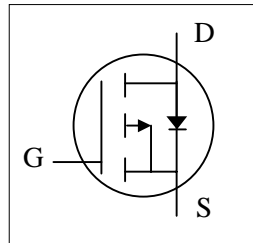




- ▼ Low Gate Charge
- ▼ Fast Switching Characteristic
- ▼ Simple Drive Requirement
- ▼ RoHS Compliant & Halogen-Free

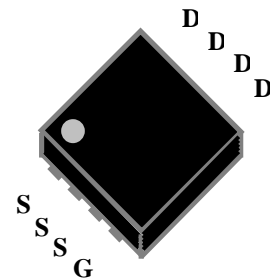


$BV_{DSS}$	-30V
$R_{DS(ON)}$	10m $\Omega$
$I_D$	-14.6A

**Description**

Advanced Power MOSFETs from APEC provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The PMPAK<sup>®</sup> 3x3 package is special for DC-DC converters application and lower 1.0mm profile with backside heat sink.



**PMPAK<sup>®</sup> 3x3**

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

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_A=25^\circ\text{C}$	Drain Current <sup>3</sup> , $V_{GS}$ @ 10V	-14.6	A
$I_D @ T_A=70^\circ\text{C}$	Drain Current <sup>3</sup> , $V_{GS}$ @ 10V	-11.7	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	-50	A
$P_D @ T_A=25^\circ\text{C}$	Total Power Dissipation	3.12	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-c	Maximum Thermal Resistance, Junction-case	5	$^\circ\text{C}/\text{W}$
Rthj-a	Maximum Thermal Resistance, Junction-ambient <sup>3</sup>	40	$^\circ\text{C}/\text{W}$



## Electrical Characteristics @T<sub>j</sub>=25°C(unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA	-30	-	-	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-10A	-	-	10	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-6A	-	-	14.5	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250uA	-1	-	-3	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-10A	-	33	-	S
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V	-	-	-10	uA
I <sub>GSS</sub>	Gate-Source Leakage	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
Q <sub>g</sub>	Total Gate Charge	I <sub>D</sub> =-6A	-	34	54.4	nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DS</sub> =-15V	-	9	-	nC
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge	V <sub>GS</sub> =-4.5V	-	12	-	nC
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DS</sub> =-15V	-	11	-	ns
t <sub>r</sub>	Rise Time	I <sub>D</sub> =-1A	-	9	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time	R <sub>G</sub> =3.3Ω	-	150	-	ns
t <sub>f</sub>	Fall Time	V <sub>GS</sub> =-10V	-	70	-	ns
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V	-	3800	6080	pF
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> =-15V	-	500	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance	f=1.0MHz	-	345	-	pF
R <sub>g</sub>	Gate Resistance	f=1.0MHz	-	9	18	Ω

## Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V <sub>SD</sub>	Forward On Voltage <sup>2</sup>	I <sub>S</sub> =-2.6A, V <sub>GS</sub> =0V	-	-	-1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>S</sub> =-10A, V <sub>GS</sub> =0V,	-	27	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge	di/dt=100A/μs	-	16	-	nC

### Notes:

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

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

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

APEC 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.

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

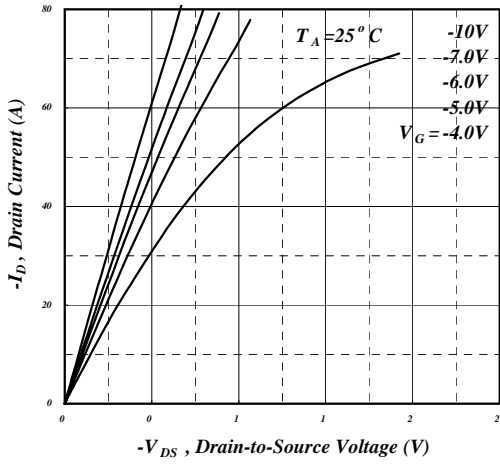


Fig 1. Typical Output Characteristics

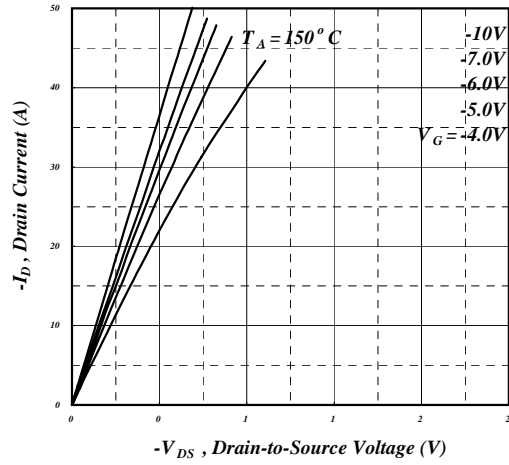


Fig 2. Typical Output Characteristics

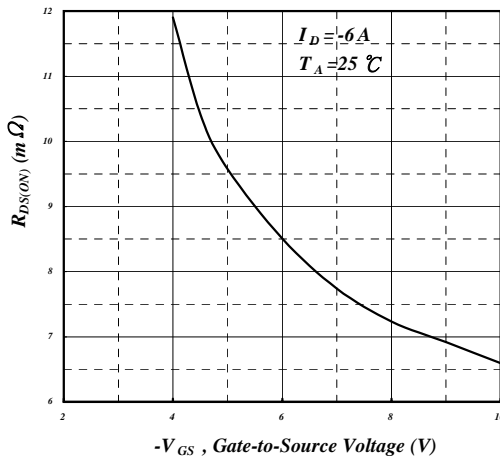


Fig 3. On-Resistance v.s. Gate Voltage

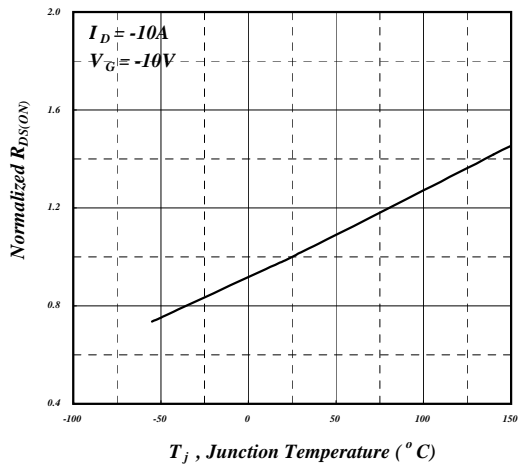


Fig 4. Normalized On-Resistance v.s. Junction Temperature

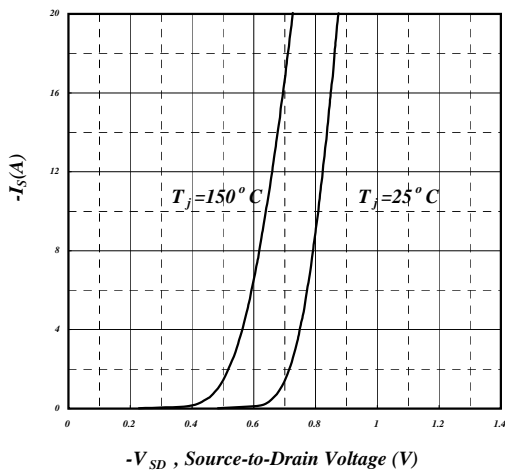


Fig 5. Forward Characteristic of Reverse Diode

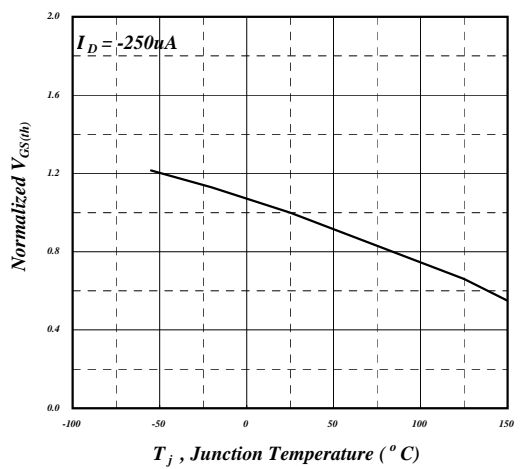


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

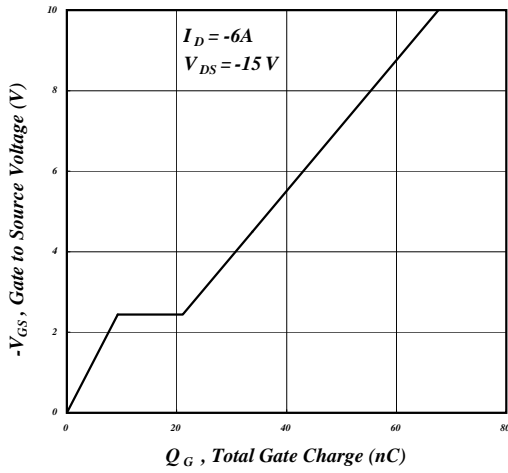


Fig 7. Gate Charge Characteristics

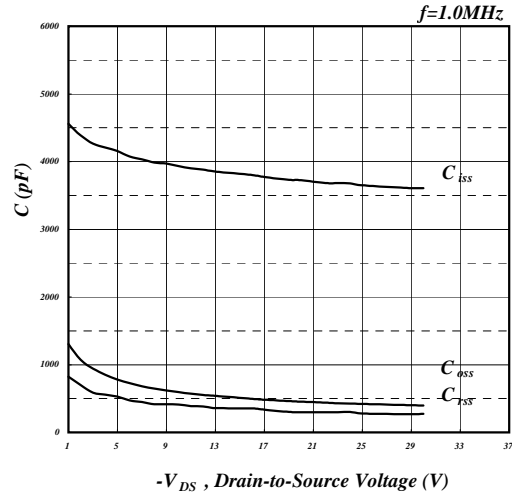


Fig 8. Typical Capacitance Characteristics

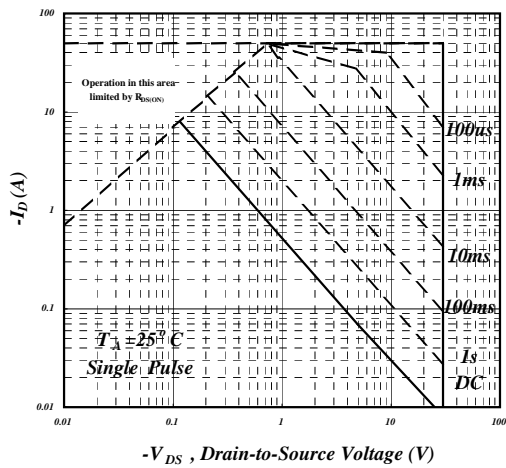


Fig 9. Maximum Safe Operating Area

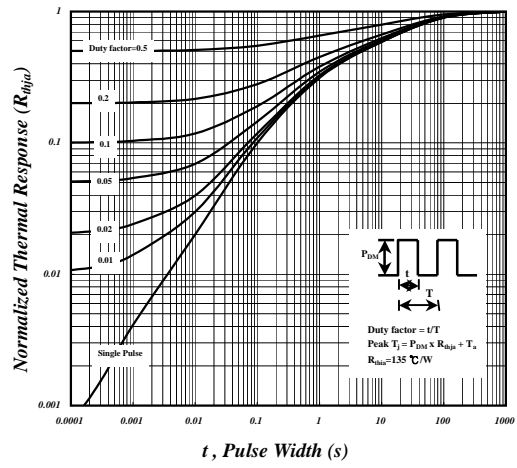


Fig 10. Effective Transient Thermal Impedance

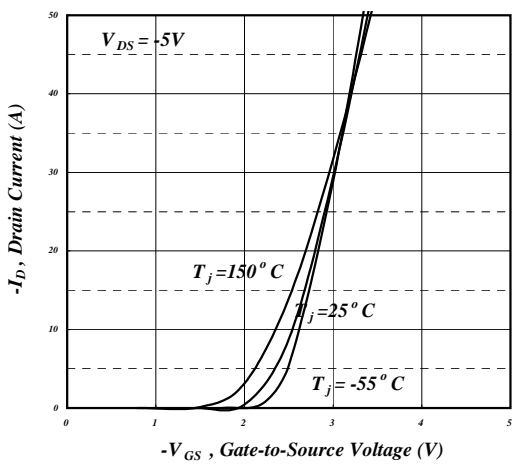


Fig 11. Transfer Characteristics

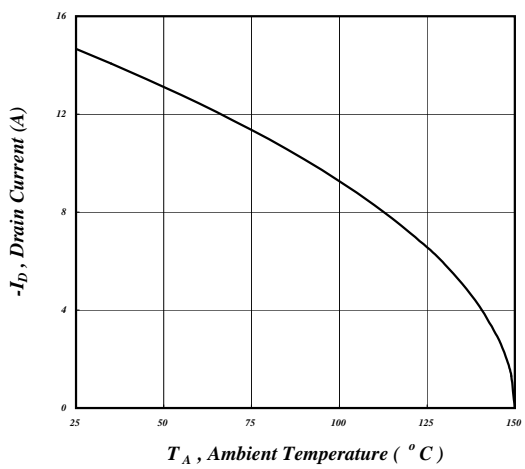
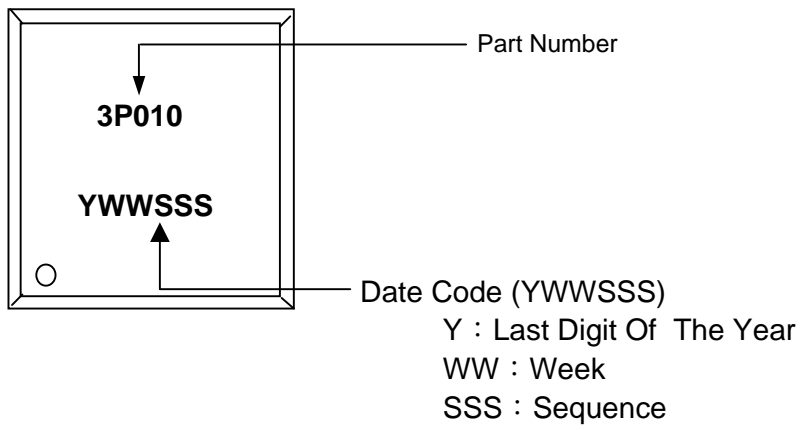


Fig 12. Drain Current v.s. Ambient Temperature



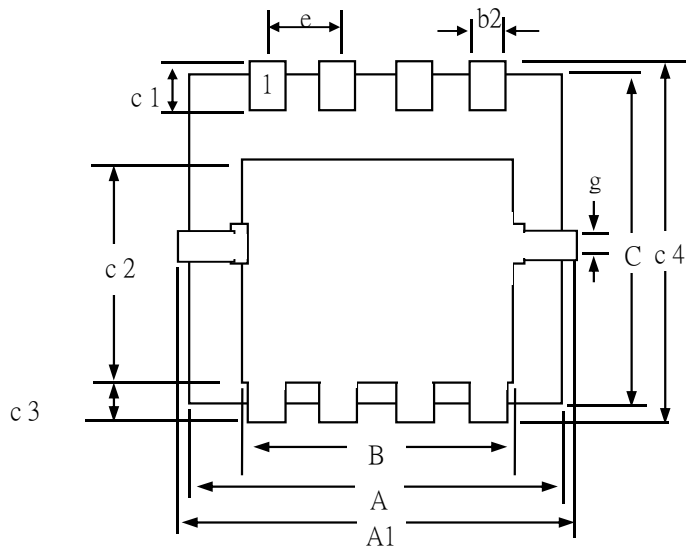
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## MARKING INFORMATION

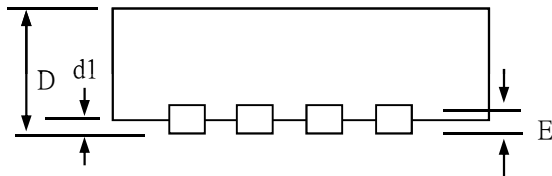




## Package Outline : PMPAK 3x3 (E-TYPE)



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	3.000	3.30	3.600
c4	3.000	3.30	3.600
g	0.20 (ref)		

1.All Dimension Are In Millimeters.

2.Dimension Does Not Include Mold Protrusions.



**PMPAK3X3(E-TYPE) FOOTPRINT :**

