

# AP65SL045AFWL

**Halogen-Free Product**

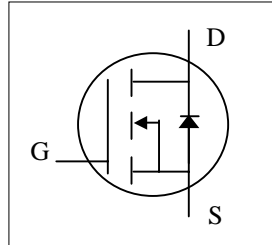


**Advanced Power  
Electronics Corp.**

*N-CHANNEL ENHANCEMENT MODE*

*POWER MOSFET*

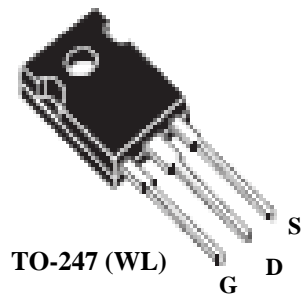
- ▼ Ultra-Fast Body Diode
- ▼ 100% R<sub>g</sub> & UIS Test
- ▼ Fast Switching Characteristic
- ▼ RoHS Compliant & Halogen-Free



$BV_{DSS}$	650V
$R_{DS(ON)}$	45mΩ
$I_D$	63.7A

## Description

AP65SL045AF 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 TO-247 package is widely preferred for commercial-industrial applications. The device is suited for switch mode power supplies, DC-AC converters and high current high speed switching circuits.

## Absolute Maximum Ratings @T<sub>j</sub>=25°C(unless otherwise specified)

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	650	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$V_{GS}$	Gate-Source Voltage, AC (f > 1Hz)	$\pm 30$	V
$I_D @ T_C = 25^\circ C$	Drain Current, $V_{GS} @ 10V$	63.7	A
$I_D @ T_C = 100^\circ C$	Drain Current, $V_{GS} @ 10V$	40.3	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	210	A
dv/dt	MOSFET dv/dt Ruggedness ( $V_{DS} = 0 \dots 600V$ )	20	V/ns
$P_D @ T_C = 25^\circ C$	Total Power Dissipation	500	W
$P_D @ T_A = 25^\circ C$	Total Power Dissipation	3.12	W
$E_{AS}$	Single Pulse Avalanche Energy <sup>3</sup>	1875	mJ
dv/dt	Peak Diode Recovery dv/dt <sup>4</sup>	15	V/ns
$T_{STG}$	Storage Temperature Range	-55 to 150	°C
$T_J$	Operating Junction Temperature Range	-55 to 150	°C

## Thermal Data

Symbol	Parameter	Value	Units
Rthj-c	Maximum Thermal Resistance, Junction-case	0.25	°C/W
Rthj-a	Maximum Thermal Resistance, Junction-ambient	40	°C/W



# AP65SL045AFWL

## 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> =1mA	650	-	-	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =30A	-	-	45	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =3mA	2	-	5	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =10V, I <sub>D</sub> =30A	-	55	-	S
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =520V, V <sub>GS</sub> =0V	-	-	100	uA
I <sub>GSS</sub>	Gate-Source Leakage	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±1	uA
Q <sub>g</sub>	Total Gate Charge	I <sub>D</sub> =40A	-	273	437	nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DS</sub> =480V	-	60	-	nC
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge	V <sub>GS</sub> =10V	-	120	-	nC
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> =300V	-	50	-	ns
t <sub>r</sub>	Rise Time	I <sub>D</sub> =40A	-	140	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time	R <sub>G</sub> =3.3Ω	-	293	-	ns
t <sub>f</sub>	Fall Time	V <sub>GS</sub> =10V	-	104	-	ns
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V	-	10500	16800	pF
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> =100V	-	260	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance	f=1.0MHz	-	70	-	pF
R <sub>g</sub>	Gate Resistance	f=1.0MHz	-	6	-	Ω

## Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
I <sub>S</sub>	Source Current ( Body Diode )	T <sub>C</sub> =25°C	-	-	63.7	A
V <sub>SD</sub>	Forward On Voltage <sup>2</sup>	I <sub>S</sub> =40A, V <sub>GS</sub> =0V	-	0.9	-	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>S</sub> =40A, V <sub>GS</sub> =0V	-	170	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge	di/dt=100A/μs	-	1	-	μC

### Notes:

1. Pulse width limited by max. junction temperature.
2. Pulse test
3. Starting T<sub>j</sub>=25°C, V<sub>DD</sub>=50V, L=150mH, R<sub>G</sub>=25Ω
4. I<sub>SD</sub> ≤ I<sub>D</sub>, V<sub>DD</sub> ≤ BV<sub>DSS</sub>, starting T<sub>J</sub> = 25°C

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.

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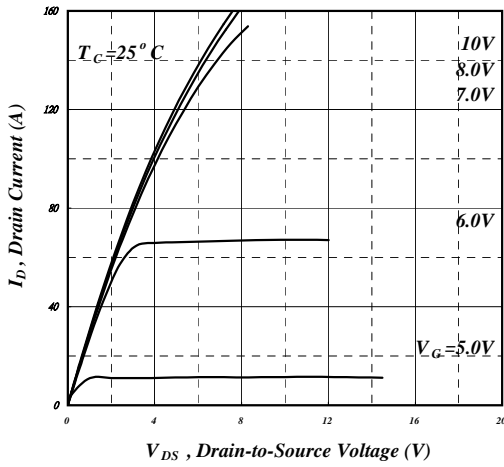


Fig 1. Typical Output Characteristics

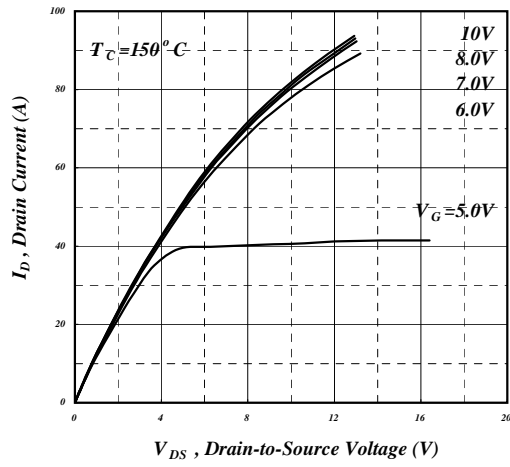


Fig 2. Typical Output Characteristics

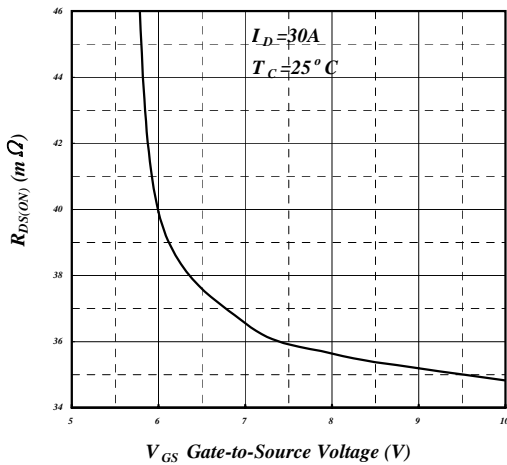


Fig 3. On-Resistance v.s. Gate Voltage

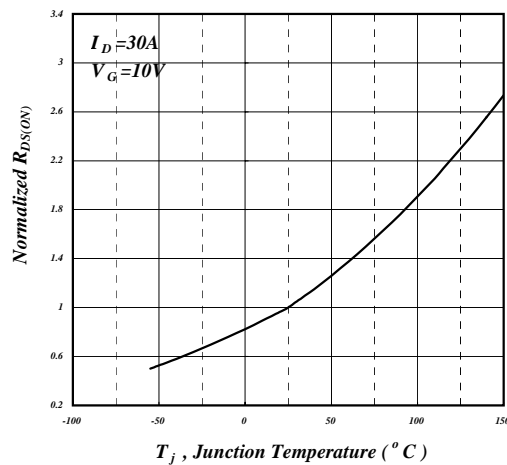


Fig 4. Normalized On-Resistance v.s. Junction Temperature

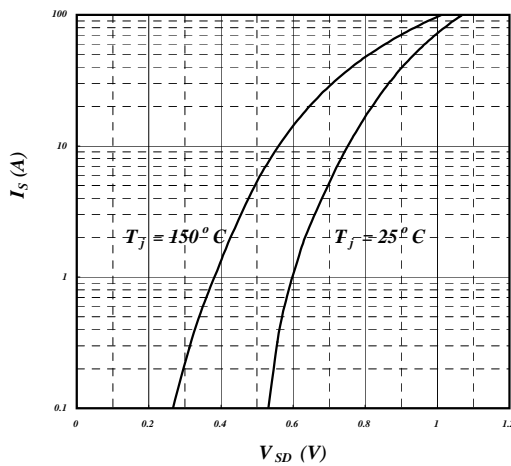


Fig 5. Forward Characteristic of Reverse Diode

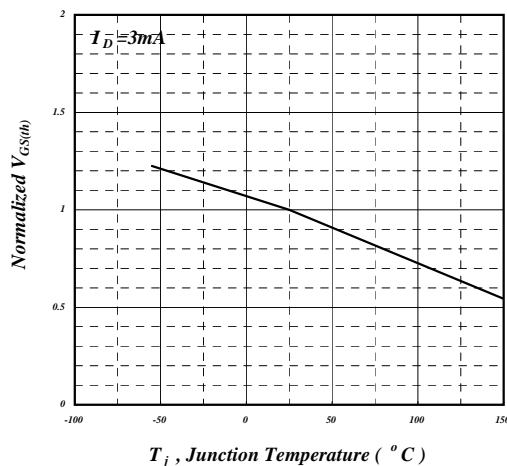


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

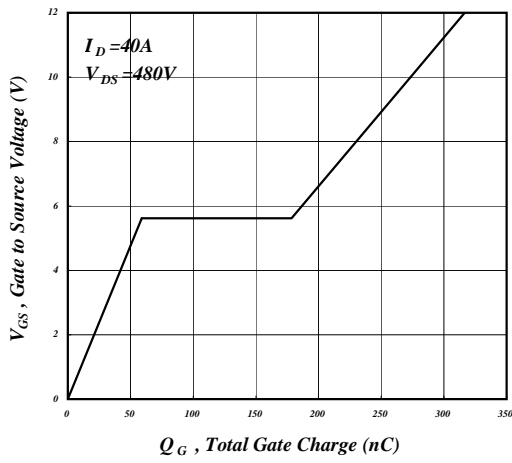


Fig 7. Gate Charge Characteristics

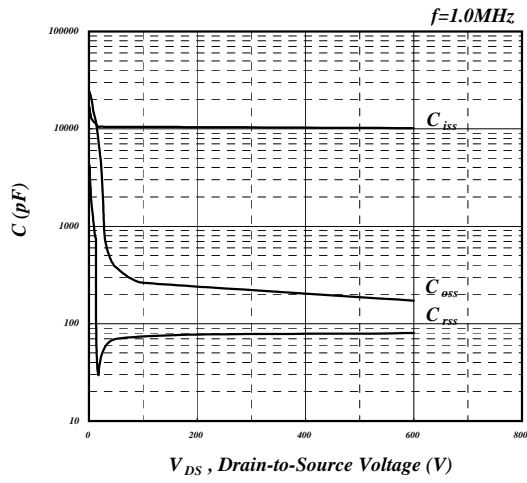


Fig 8. Typical Capacitance Characteristics

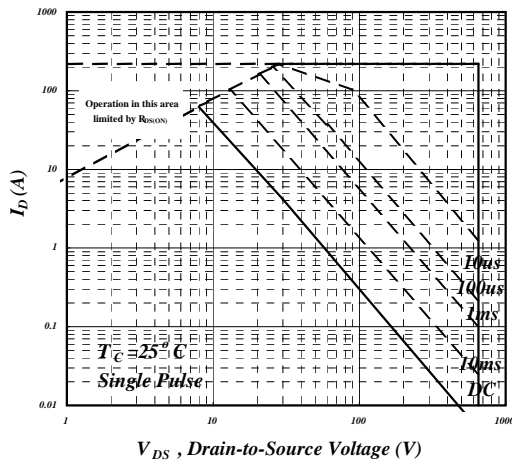


Fig 9. Maximum Safe Operating Area

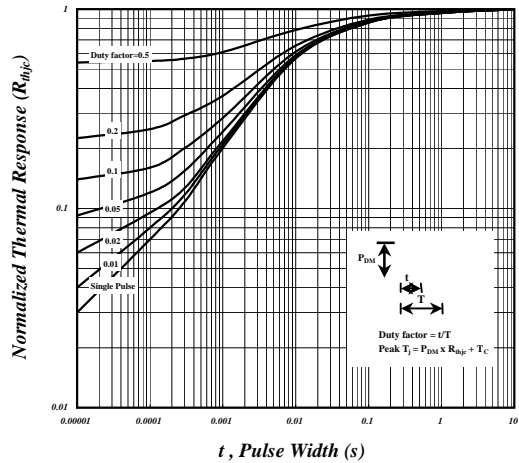


Fig 10. Effective Transient Thermal Impedance

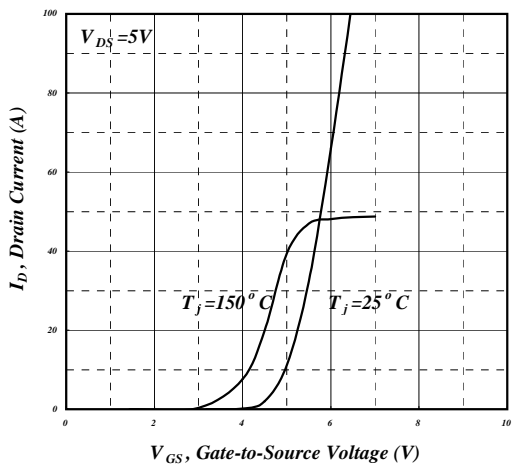


Fig 11. Transfer Characteristics

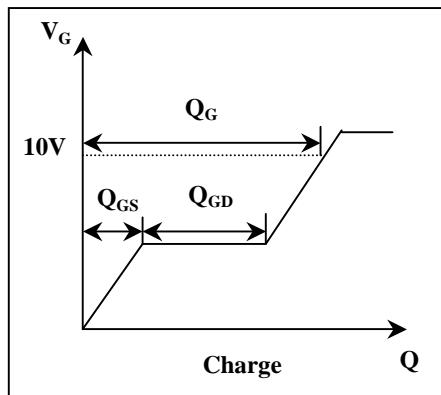


Fig 12. Gate Charge Waveform

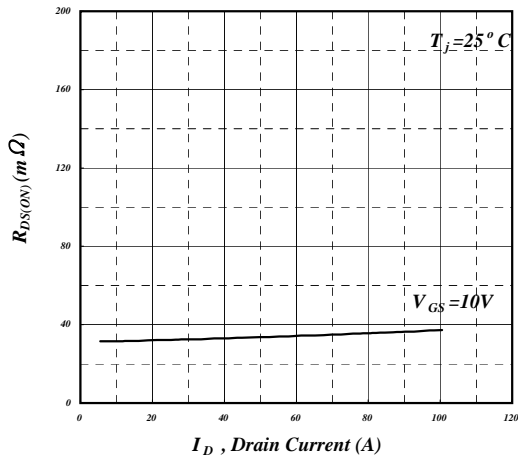


Fig 13. Typ. Drain-Source on State Resistance

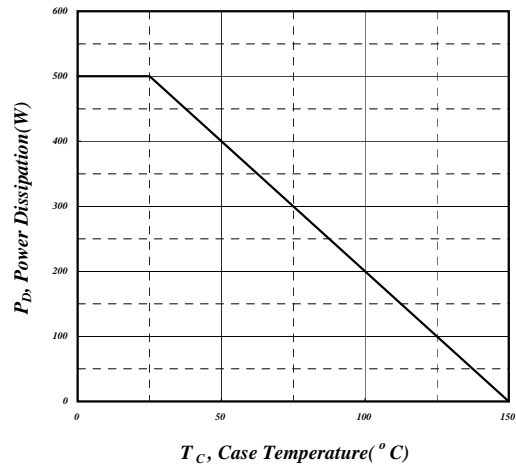


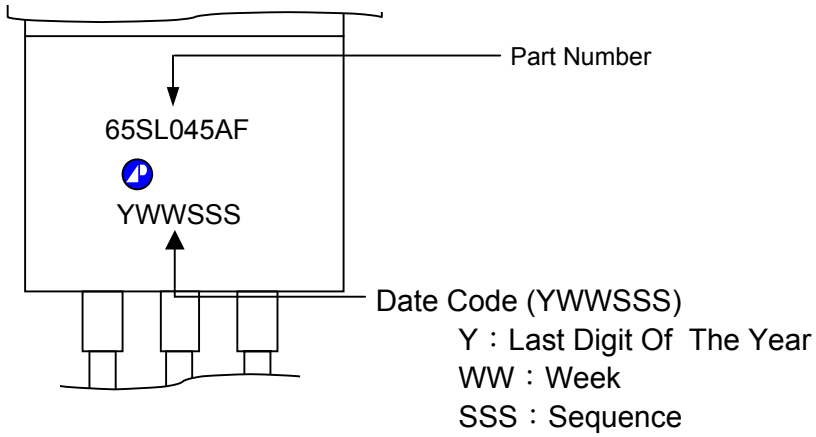
Fig 14. Total Power Dissipation



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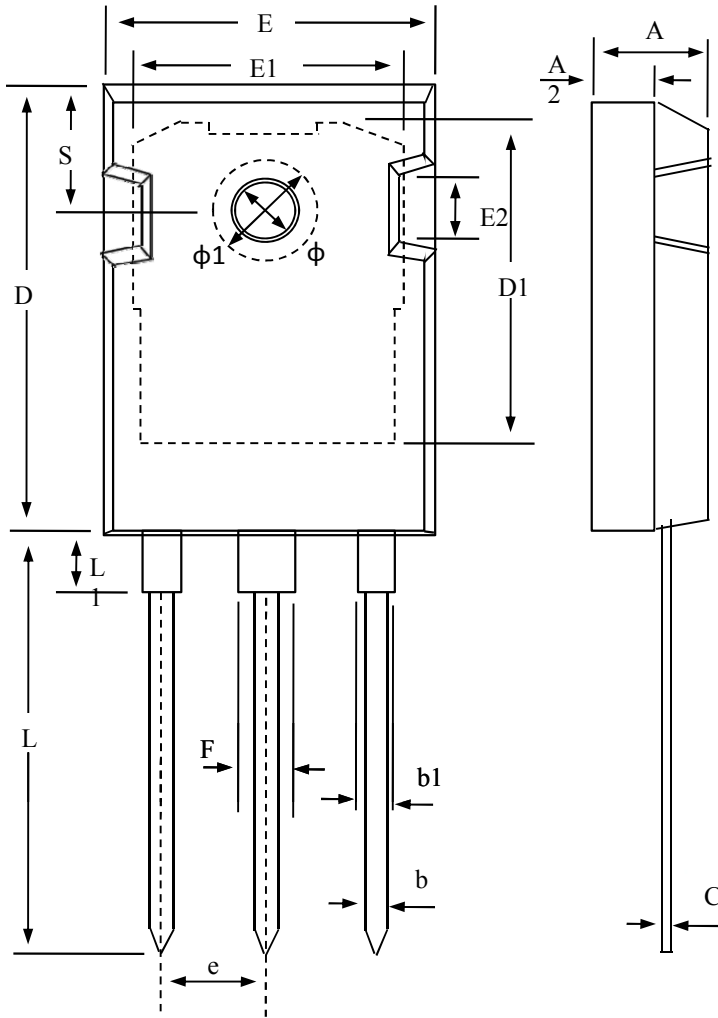
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## MARKING INFORMATION





## Package Outline : TO-247



SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	4.80	5.03	5.25
A2	1.90	2.05	2.20
E	15.75	15.95	16.15
E1	13.00	13.60	14.20
E2	3.60	4.35	5.10
D	20.80	20.95	21.10
D1	16.20	16.95	17.70
C	0.50	0.60	0.70
L	19.80	20.10	20.40
L1	4.10	4.25	4.40
F	2.80	3.10	3.40
b	1.05	1.20	1.35
b1	1.90	2.18	2.45
e	5.44 ref.		
$\phi$	3.50	3.58	3.65
$\phi 1$	7.18 ref.		
S	6.00	6.15	6.30

1.All Dimensions Are in Millimeters.

2.Dimension Does Not Include Mold Protrusions.



**TO-247 FOOTPRINT :**

