

# AP90T03GS-HF

**Halogen-Free Product**

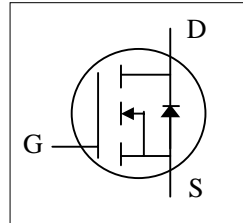


**Advanced Power  
Electronics Corp.**

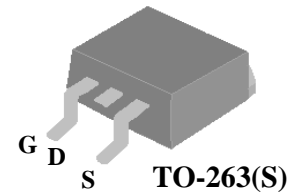
*N-CHANNEL ENHANCEMENT MODE*

*POWER MOSFET*

- ▼ Lower On- resistance
- ▼ Simple Drive Requirement
- ▼ Fast Switching Characteristic
- ▼ RoHS Compliant & Halogen-Free



$BV_{DSS}$	30V
$R_{DS(ON)}$	4m $\Omega$
$I_D$	75A



## Description

AP90T03 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-263 package is widely preferred for all commercial-industrial surface mount applications using infrared reflow technique and suited for high current application due to the low connection resistance.

## 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	+20	V
$I_D@T_C=25^\circ\text{C}$	Drain Current, $V_{GS}@10\text{V}^3$	75	A
$I_D@T_C=100^\circ\text{C}$	Drain Current, $V_{GS}@10\text{V}$	63	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	350	A
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation	96	W
$P_D@T_A=25^\circ\text{C}$	Total Power Dissipation <sup>4</sup>	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	Units
Rthj-c	Maximum Thermal Resistance, Junction-case	1.3	$^\circ\text{C}/\text{W}$
Rthj-a	Maximum Thermal Resistance, Junction-ambient (PCB mount) <sup>4</sup>	40	$^\circ\text{C}/\text{W}$



# AP90T03GS-HF

## 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	30	-	-	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =45A	-	-	4	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =30A	-	-	6	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	0.8	-	3	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> =30V, V <sub>GS</sub> =0V	-	-	1	uA
	Drain-Source Leakage Current (T <sub>j</sub> =125°C)	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V	-	-	250	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 <sup>2</sup>	I <sub>D</sub> =40A	-	60	96	nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DS</sub> =24V	-	8.5	-	nC
Q <sub>gd</sub>	Gate-Drain ("Miller") Charge	V <sub>GS</sub> =4.5V	-	38	-	nC
t <sub>d(on)</sub>	Turn-on Delay Time <sup>2</sup>	V <sub>DS</sub> =15V	-	14	-	ns
t <sub>r</sub>	Rise Time	I <sub>D</sub> =30A	-	83	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time	R <sub>G</sub> =3.3Ω	-	66	-	ns
t <sub>f</sub>	Fall Time	V <sub>GS</sub> =10V	-	120	-	ns
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V	-	4090	6540	pF
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> =25V	-	1010	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance	f=1.0MHz	-	890	-	pF

## 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> =45A, V <sub>GS</sub> =0V	-	-	1.3	V
t <sub>rr</sub>	Reverse Recovery Time <sup>2</sup>	I <sub>S</sub> =30A, V <sub>GS</sub> =0V,	-	51	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge	di/dt=100A/μs	-	63	-	nC

### Notes:

- 1.Pulse width limited by Max. junction temperature.
- 2.Pulse test
- 3.Package limitation current is 75A, calculated continuous current based on maximum allowable junction temperature is 125A.
- 4.Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board

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.

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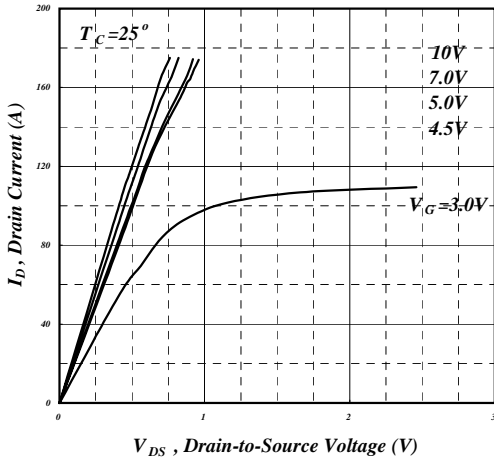


Fig 1. Typical Output Characteristics

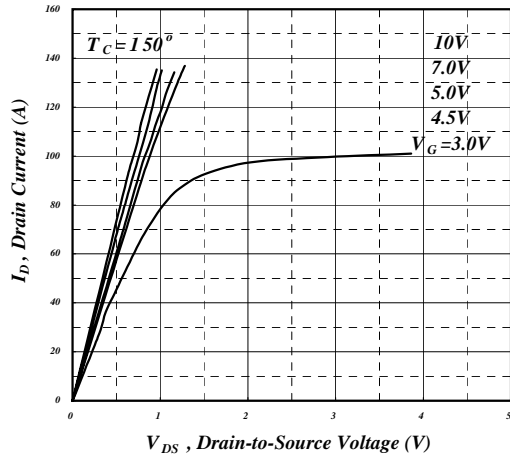


Fig 2. Typical Output Characteristics

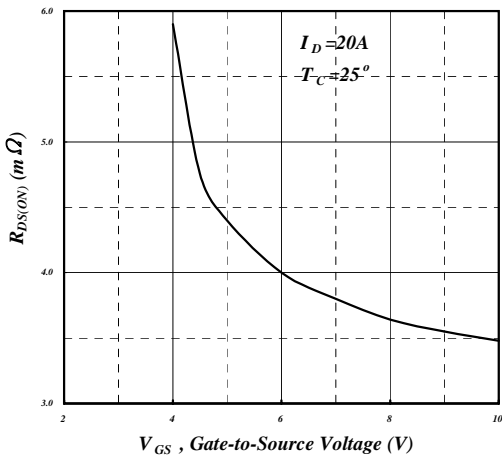


Fig 3. On-Resistance v.s. Gate Voltage

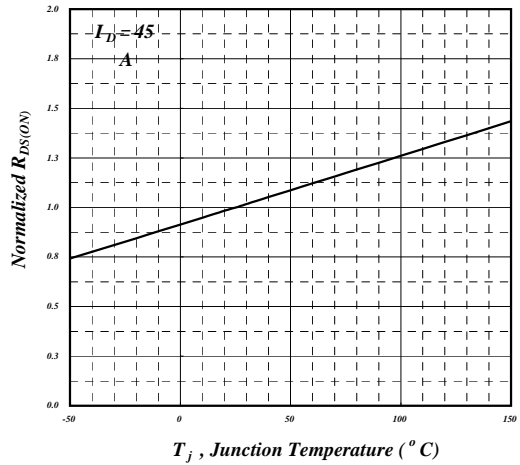


Fig 4. Normalized On-Resistance v.s. Junction Temperature

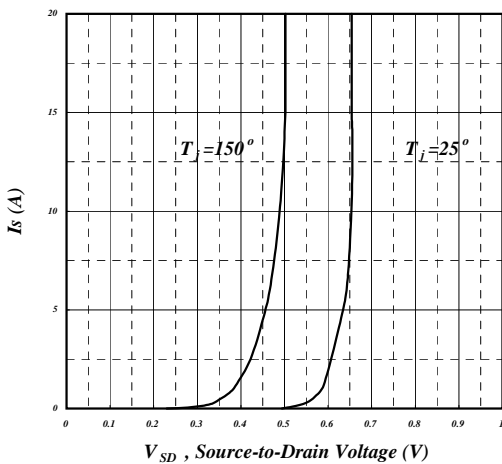


Fig 5. Forward Characteristic of Reverse Diode

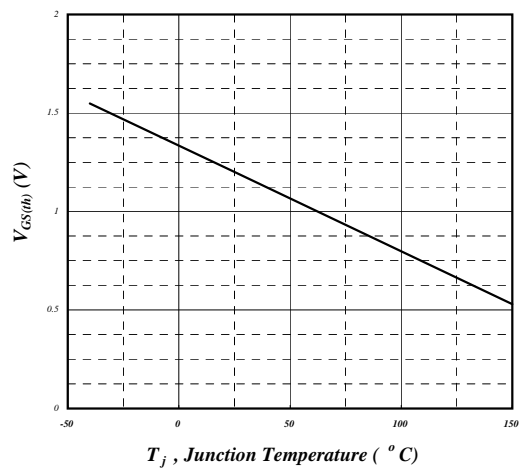
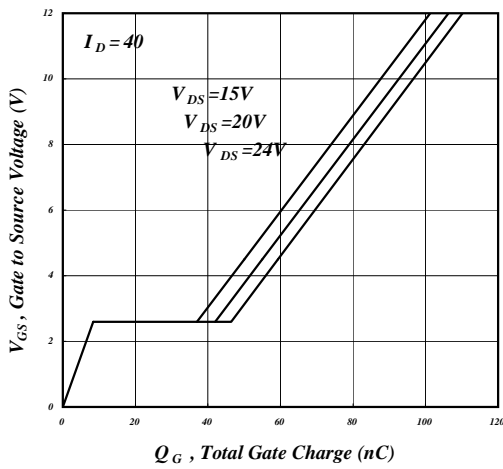
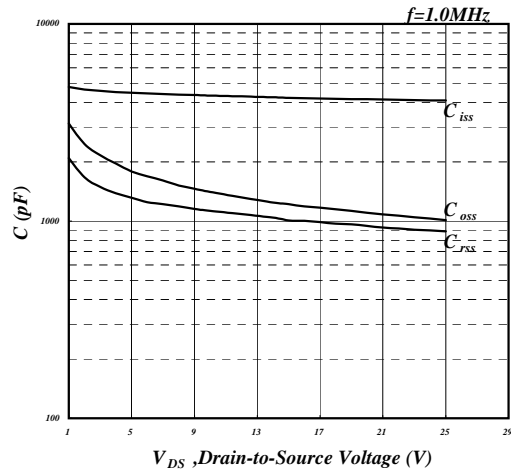


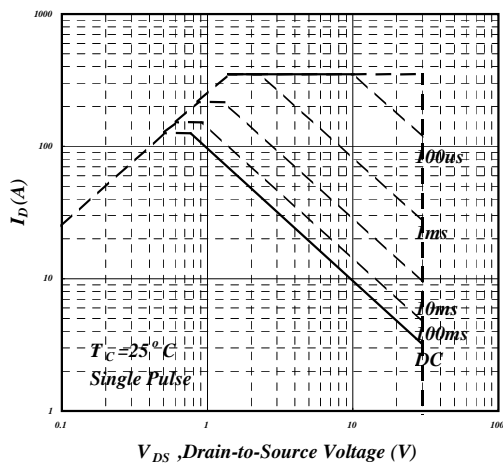
Fig 6. Gate Threshold Voltage v.s. Junction Temperature



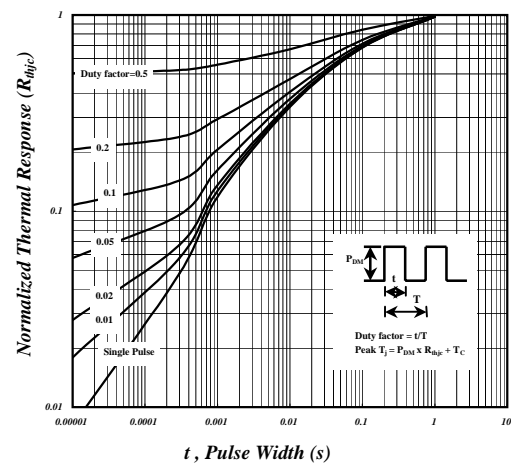
**Fig 7. Gate Charge Characteristics**



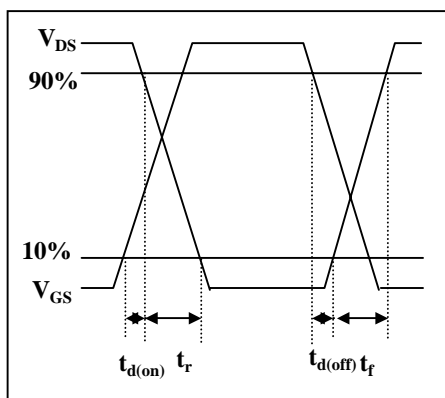
**Fig 8. Typical Capacitance Characteristics**



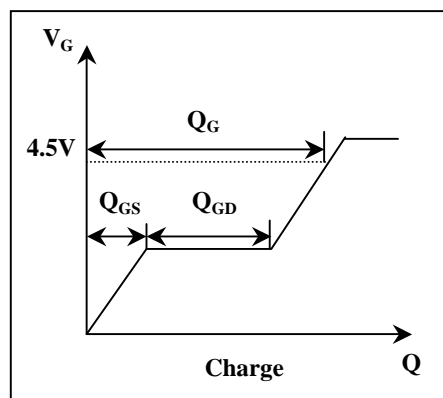
**Fig 9. Maximum Safe Operating Area**



**Fig 10. Effective Transient Thermal Impedance**



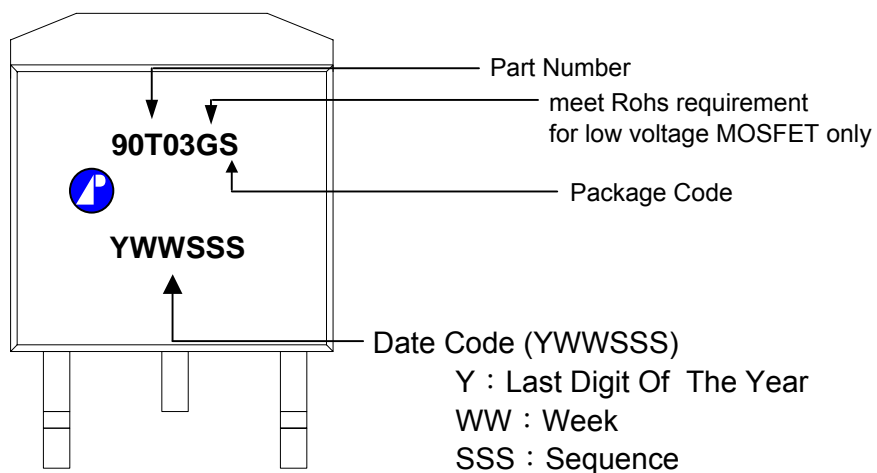
**Fig 11. Switching Time Waveform**



**Fig 12. Gate Charge Waveform**

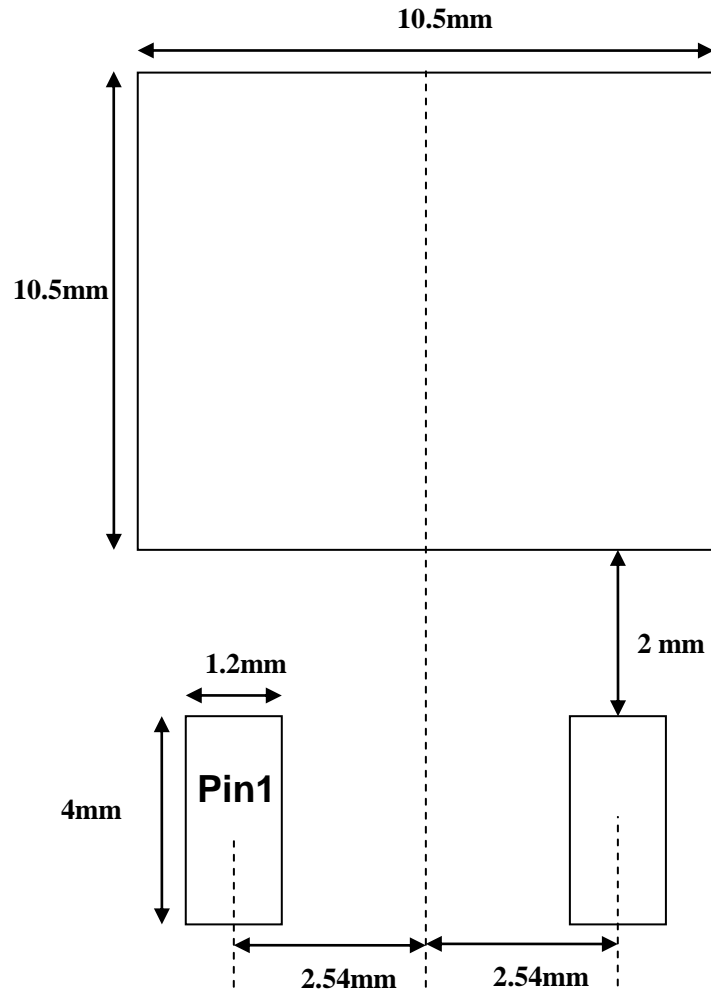


**MARKING INFORMATION**



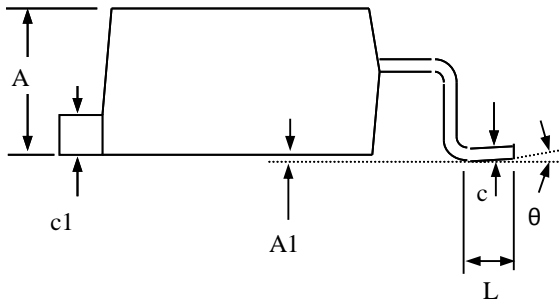
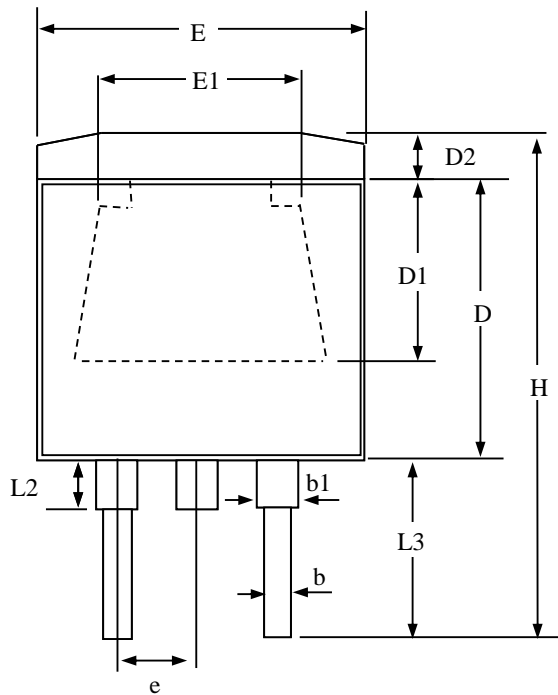


TO-263 FOOTPRINT :





## Package Outline : TO-263



SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	4.00	4.75	5.20
A1	0.00	0.15	0.30
b	0.50	0.90	1.10
b1	1.07	1.27	1.47
c	0.30	0.55	0.80
c1	1.10	1.40	1.70
D	8.30	9.05	9.80
D1	5.10(ref)		
D2	1.27(ref)		
E	9.50	10.10	10.70
E1	7.00~9.00(ref)		
e	2.04	2.54	3.04
L1	2.54(ref)		
L2	1.5 (ref)		
L3	3.50	4.50	5.50
$\theta$	0°	-----	8°
H	13.07	15.27	16.57

- 1.All Dimensions Are in Millimeters.
- 2.Dimension Does Not Include Mold Protrusions.