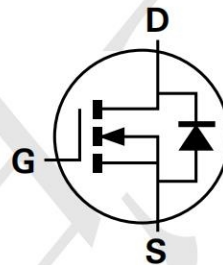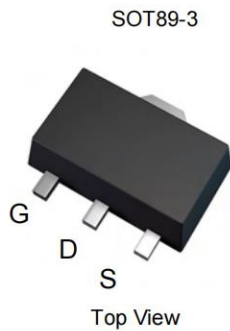## Features

- V_{DS} =60V, I_D =3.5A
  $R_{DS(ON)}$ <100mΩ @ V_{GS}=10V
  $R_{DS(ON)}$ < 120mΩ @ V_{GS}=4.5V
- High Power and current handing capability
- Lead free product is acquired
- Surface mount package

Application

- Load/Power Switching
- Interfacing Switching
- Battery Management for Ultra Small Portable Electronics
- Logic Level Shift

Package and Pin Configuration

SOT89-3

G
D
S
Top View

D

G

S

Marking: Ᵽ 603N

Absolute Maximum Ratings (T$_A$=25℃ unless otherwise noted)

| Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	3.5	A
Drain Current-Pulsed [Note 1]	I_{DM}	10	A
Maximum Power Dissipation	P_D	1.7	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient [Note 2]	$R_{θJA}$	73.5	℃/W

Electrical Characteristics (T_A=25℃ unless otherwise noted)

| Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250µA	60	-		V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=60V,V_{GS}=0V	-	-	1	µA
Parameter	**Symbol**	**Condition**	**Min**	**Typ**	**Max**	**Unit**
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250µA	1		2.3	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=3A	-	62		mΩ
		V_{GS}=4.5V, I_D=3A	-	-	120	mΩ
Forward Transconductance	g_{FS}	V_{DS}=15V,I_D=2A	2	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{Iss}	V_{DS}=30V,V_{GS}=0V, F=1.0MHz	-	247	-	PF
Output Capacitance	C_{oss}		-	34	-	PF
Reverse Transfer Capacitance	C_{rss}		-	19.5	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=30V,I_D=1.5A V_{GS}=10V,R_{GEN}=1Ω	-	6	-	nS
Turn-on Rise Time	t_r		-	15	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	15	-	nS
Turn-Off Fall Time	t_f		-	10	-	nS
Total Gate Charge	Q_g	V_{DS}=30V,I_D=3A, V_{GS}=4.5V	-	6	-	nC
Gate-Source Charge	Q_{gs}		-	1	-	nC
Gate-Drain Charge	Q_{gd}		-	1.3	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=3A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	3	A

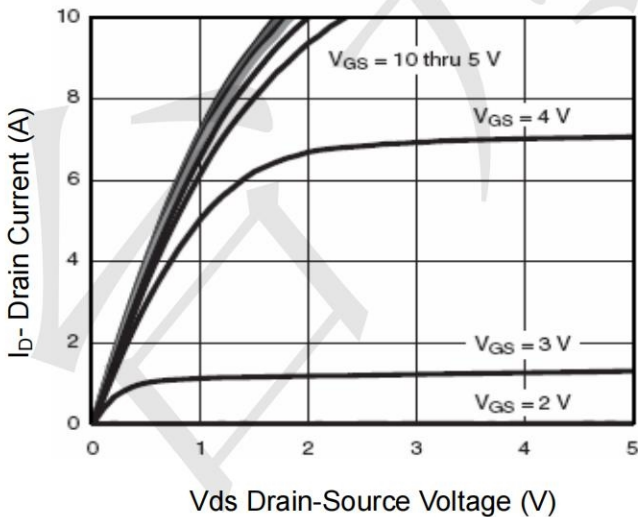# Typical Characteristics
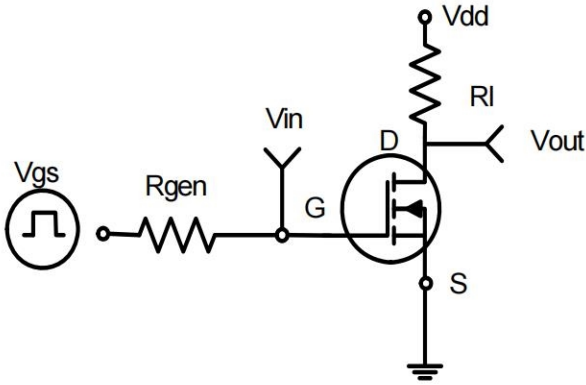
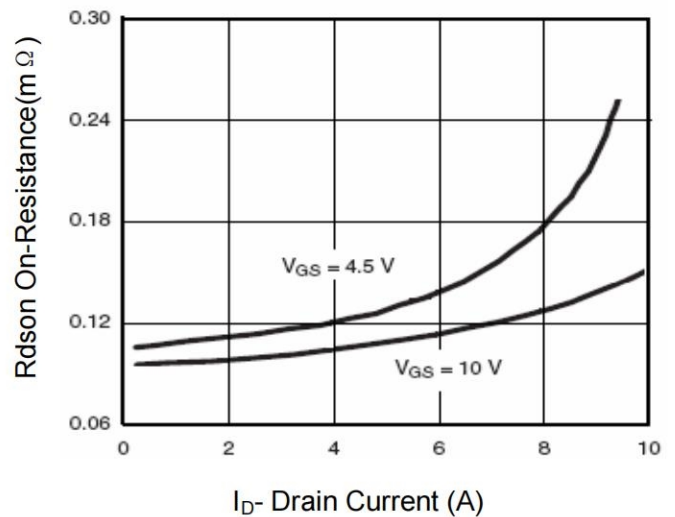**Figure 1 Switching Test Circuit**
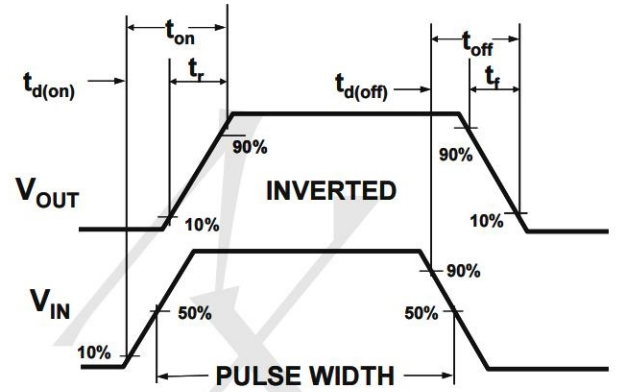
Figure 2 Switching Waveforms
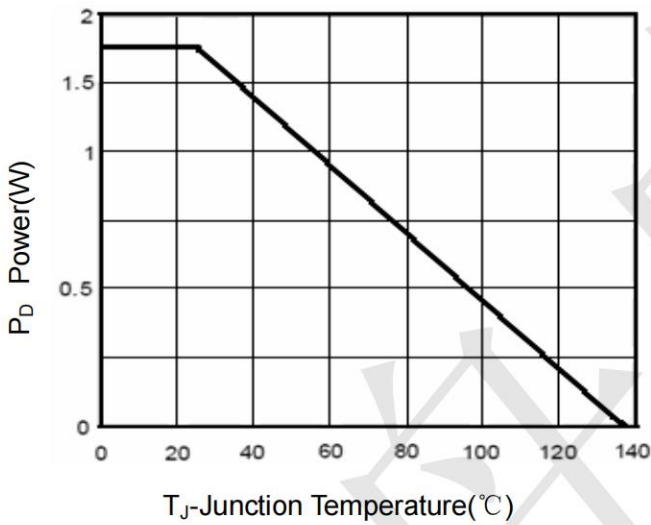
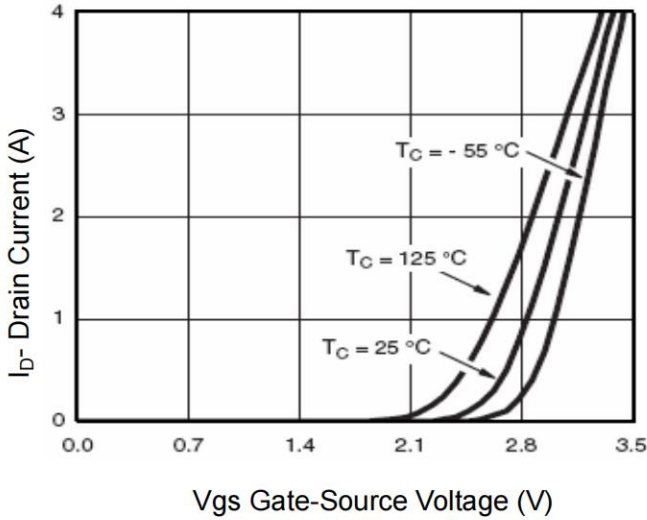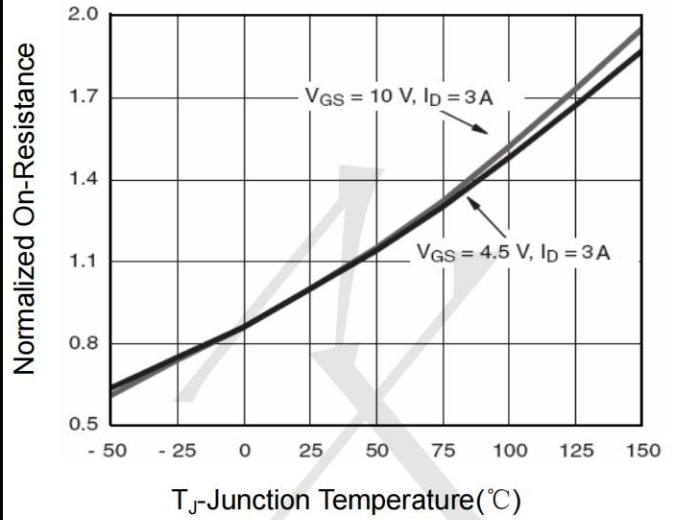**Figure 3 Power Dissipation**
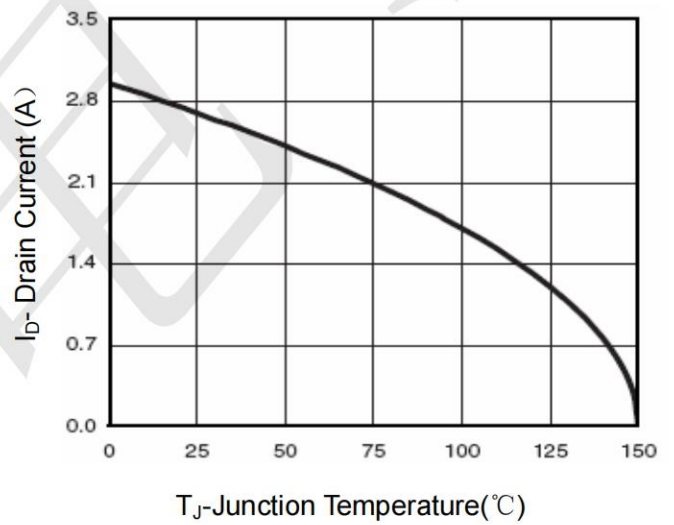
Figure 4 Drain Current

Figure 5 Output Characteristics

Figure 6 Drain-Source On-Resistance

Figure 7 Transfer Characteristics

Figure 8 Drain-Source On-Resistance
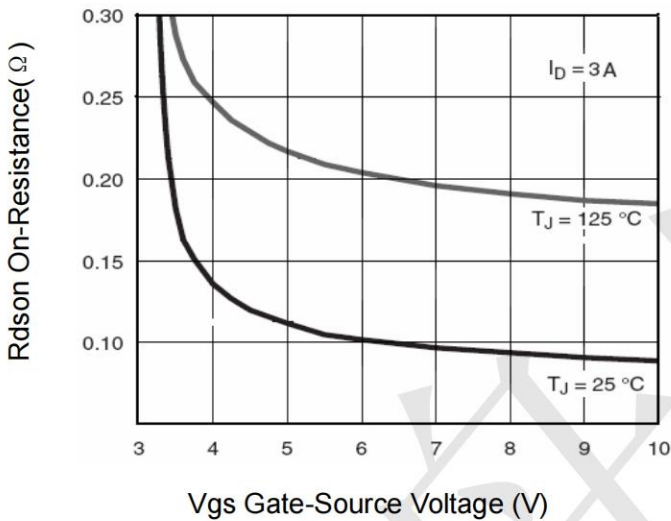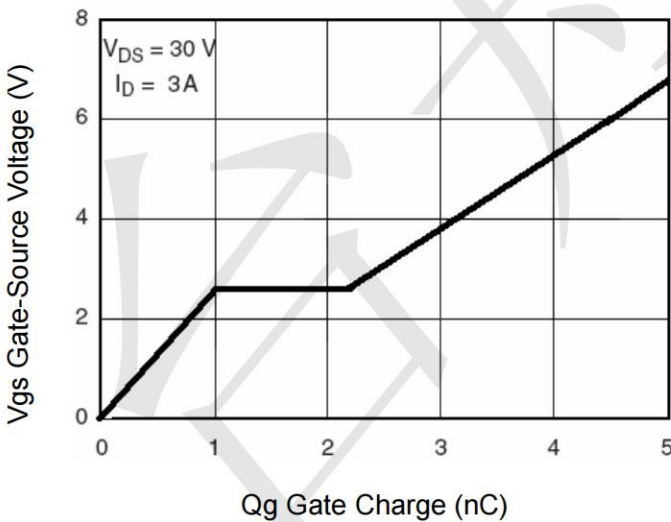

Figure 9 Rdson vs Vgs
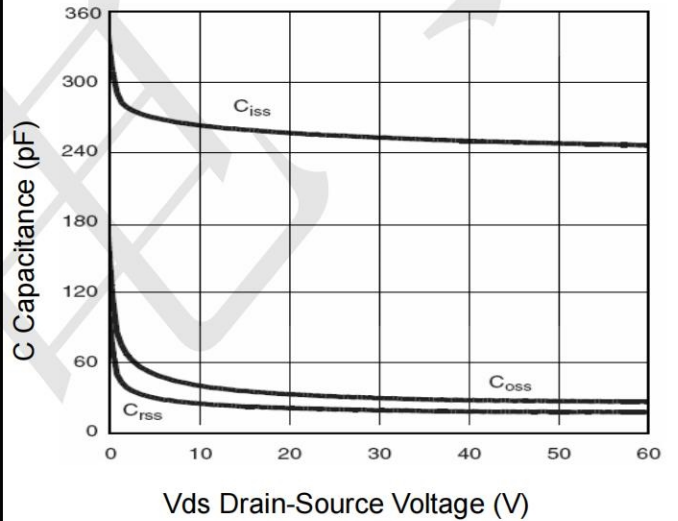
Figure 10 Capacitance vs Vds

Figure 11 Gate Charge
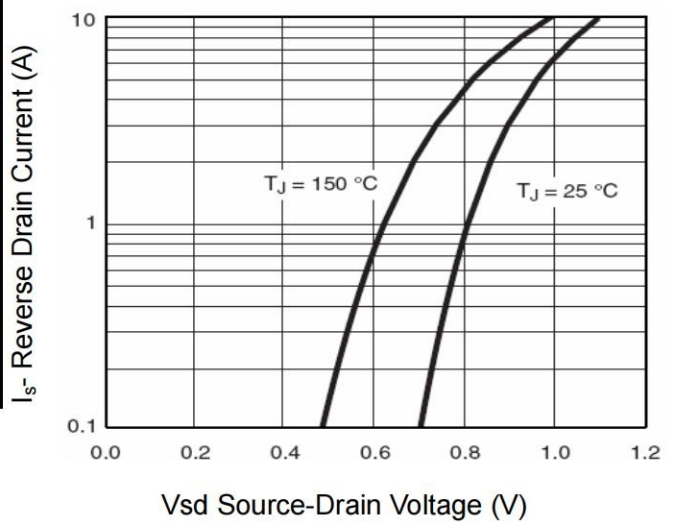
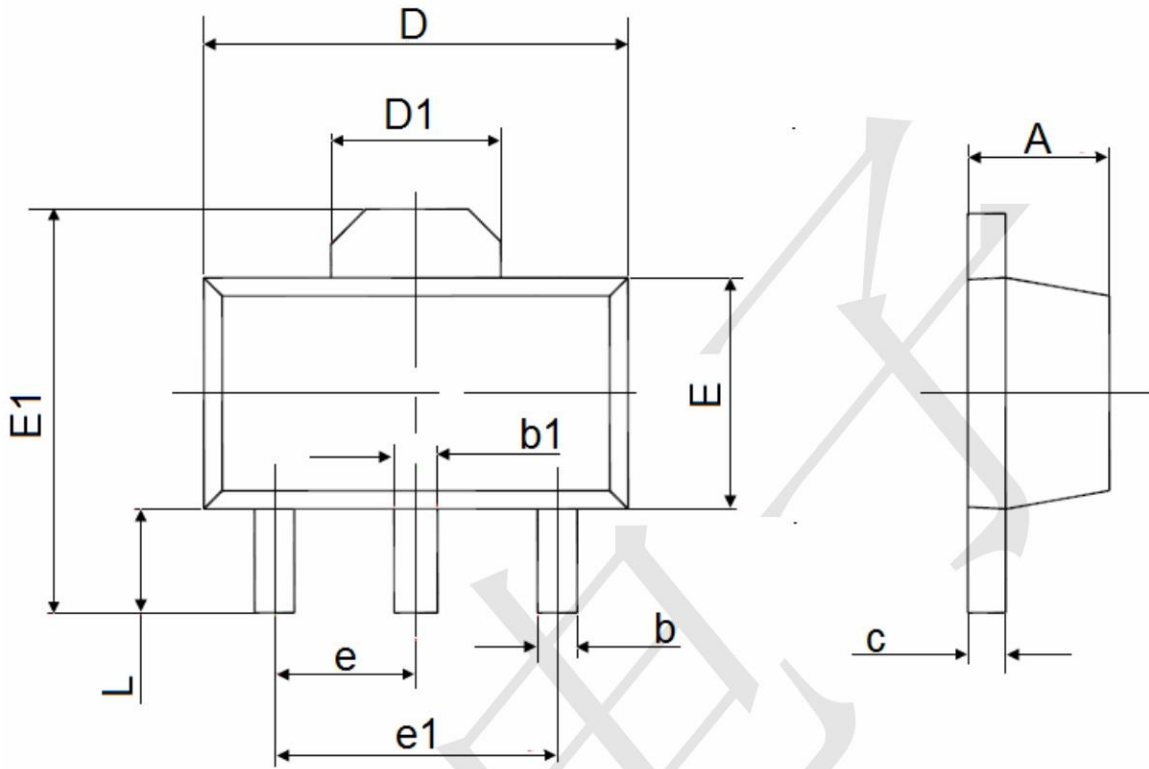**Figure 12 Source- Drain Diode Forward**
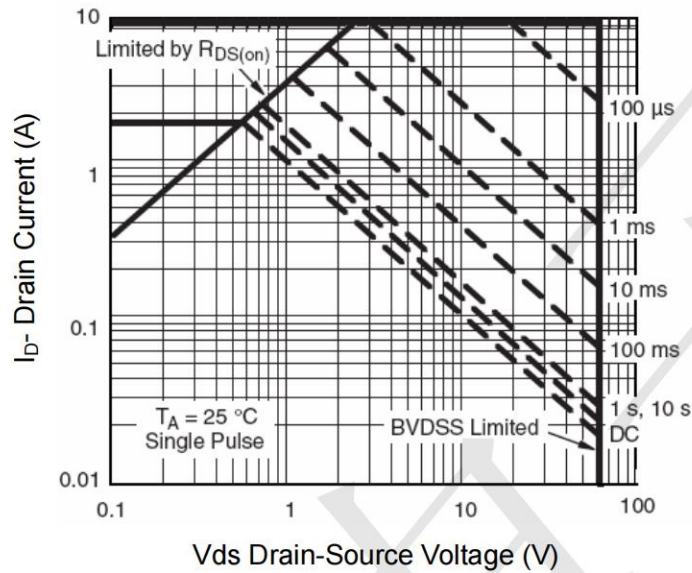
Figure 13 Safe Operation Area
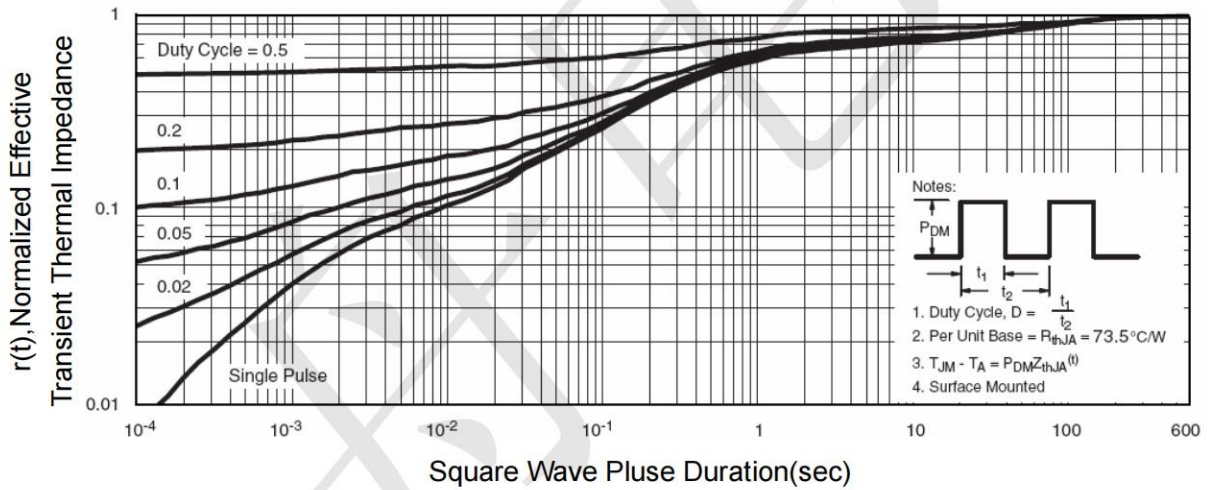
Figure 14 Normalized Maximum Transient Thermal Impedance

SOT-89-3L Package Information

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047