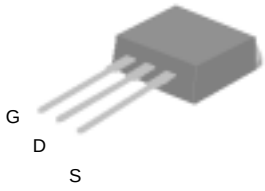
N-channel Enhancement-mode Power MOSFET

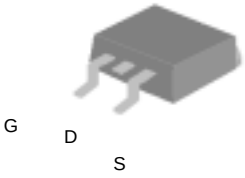
PRODUCT SUMMARY

BV_{DSS}	30V
$R_{DS(ON)}$	35mΩ
I_D	20A

Pb-free; RoHS-compliant TO-251 (IPAK) and TO-252 (DPAK)



TO-251 (suffix J)



TO-252 (suffix H)

DESCRIPTION

The SSM25T03 acheives fast switching performance with low gate charge without a complex drive circuit. It is suitable for low voltage applications such as DC/DC converters and general load-switching circuits.

The SSM25T03GH is in a TO-252 package, which is widely used for commercial and industrial surface-mount applications.

The through-hole version, the SSM250T03GJ in TO-251, is available for vertical mounting, where a small footprint is required on the board, and/or an external heatsink is to be attached.

These devices are manufactured with an advanced process, providing improved on-resistance and switching performance.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Units
V_{DS}	Drain-source voltage	30	V
V_{GS}	Gate-source voltage	±20	V
I_D	Continuous drain current, T_C = 25°C	20	A
	T_C = 100°C	12	A
I_{DM}	Pulsed drain current[1]	45	A
P_D	Total power dissipation, T_C = 25°C	20	W
	Linear derating factor	0.16	W/°C
T_{STG}	Storage temperature range	-55 to 150	°C
T_J	Operating junction temperature range	-55 to 150	°C

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Units
$R_{\Theta JC}$	Maximum thermal resistance, junction-case	6	°C/\W
$R_{\Theta JA}$	Maximum thermal resistance, junction-ambient	110	°C/W

Notes:

1.Pulse width must be limited to avoid exceeding the safe operating area.

2.Pulse width <300us, duty cycle <2%.

ELECTRICAL CHARACTERISTICS (at Tj = 25°C, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-source breakdown voltage	V_{GS}=0V, I_D=250uA	30	-	-	V
$\Delta BV_{DSS}/\Delta Tj$	Breakdown voltage temperature coefficient	Reference to 25°C, I_D=1mA	-	0.02	-	V/°C
$R_{DS(ON)}$	Static drain-source on-resistance	V_{GS}=10V, I_D=12A	-	-	35	mΩ
		V_{GS}=4.5V, I_D=7A	-	-	55	mΩ
$V_{GS(th)}$	Gate threshold voltage	V_{DS}=V_{GS}, I_D=250uA	1	-	3	V
g_{fs}	Forward transconductance	V_{DS}=10V, I_D=12A	-	13	-	S
I_{DSS}	Drain-source leakage current	V_{DS}=30V, V_{GS}=0V	-	-	1	uA
		V_{DS}=24V ,V_{GS}=0V, Tj =150°C	-	-	25	uA
I_{GSS}	Gate-source leakage current	V_{GS}=±20V	-	-	±100	nA
Q_g	Total gate charge [2]	I_D=12A	-	6	10	nC
Q_{gs}	Gate-source charge	V_{DS}=24V	-	2	-	nC
Q_{gd}	Gate-drain ("Miller") charge	V_{GS}=4.5V	-	4	-	nC
$t_{d(on)}$	Turn-on delay time [2]	V_{DS}=15V	-	6	-	ns
t_r	Rise time	I_D=12A	-	200	-	ns
$t_{d(off)}$	Turn-off delay time	R_G=3.3Ω , V_{GS}=10V	-	10	-	ns
t_f	Fall time	R_D=1.25Ω	-	3	-	ns
C_{iss}	Input capacitance	V_{GS}=0V	-	440	705	pF
C_{oss}	Output capacitance	V_{DS}=25V	-	105	-	pF
C_{rss}	Reverse transfer capacitance	f=1.0MHz	-	75	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward voltage [2]	I_S=12A, V_{GS}=0V	-	-	1.3	V
t_{rr}	Reverse-recovery time [2]	I_S=12A, V_{GS}=0V,	-	18	-	ns
Q_{rr}	Reverse-recovery charge	dI/dt=100A/μs	-	6	-	nC

Notes:

1.Pulse width must be limited to avoid exceeding the maximum junction temperature of 150°C.

2.Pulse width <300us, duty cycle <2%.

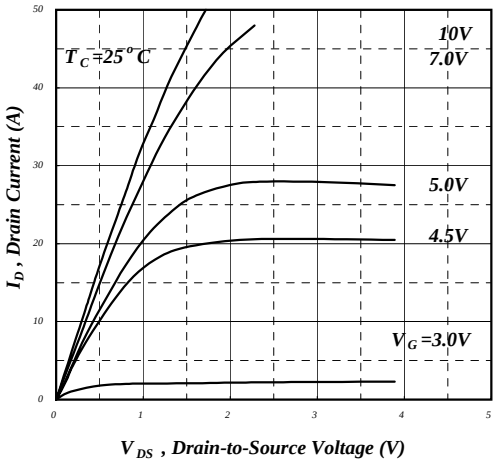


Fig 1. Typical Output Characteristics

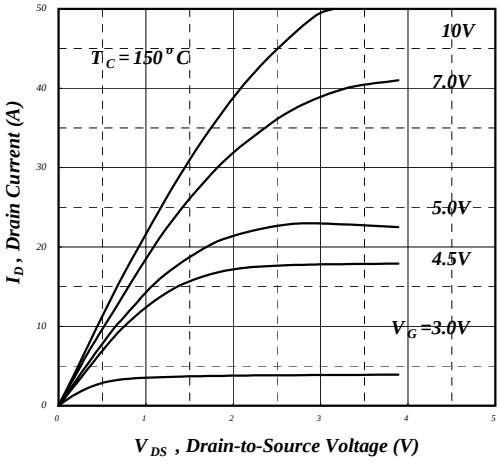


Fig 2. Typical Output Characteristics

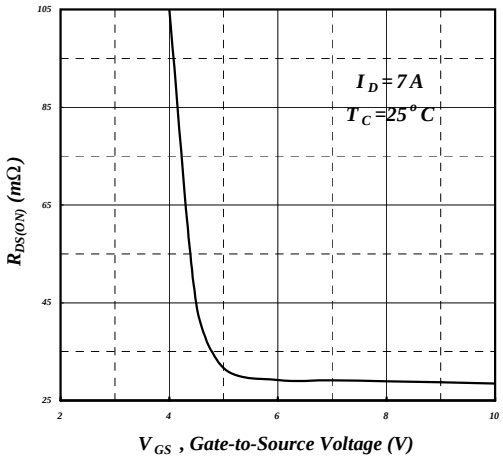


Fig 3. On-Resistance vs. Gate Voltage

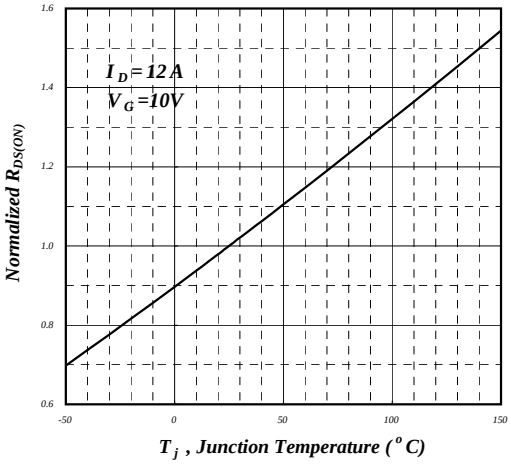


Fig 4. Normalized On-Resistance vs. Junction Temperature

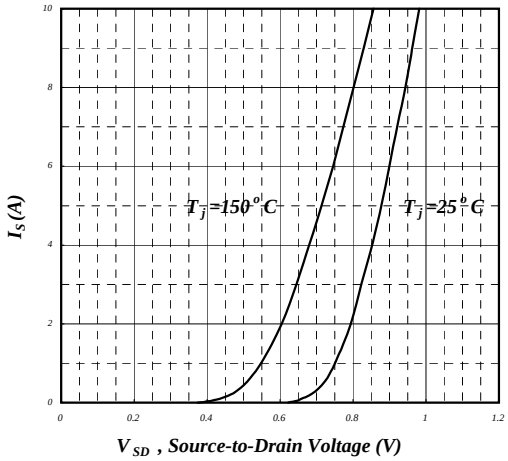


Fig 5. Forward Characteristic of Reverse Diode

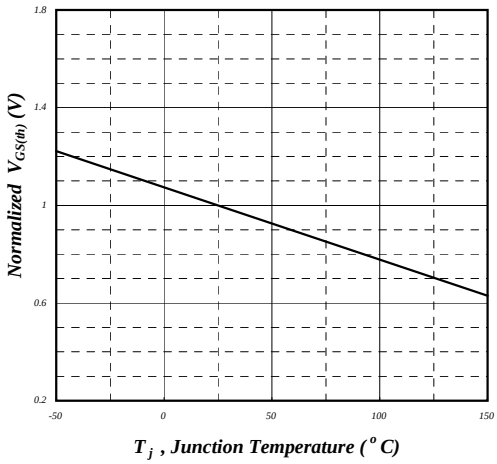


Fig 6. Gate Threshold Voltage vs. Junction Temperature

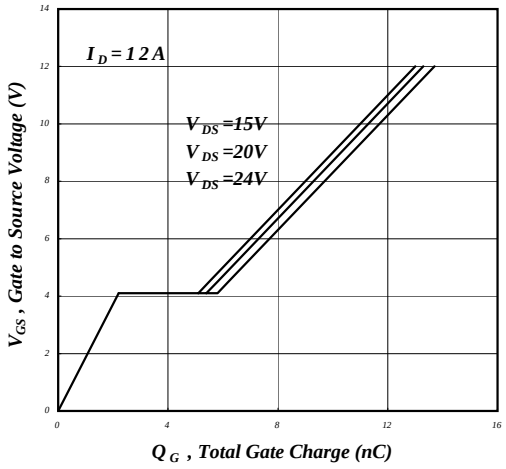


Fig 7. Gate Charge Characteristics

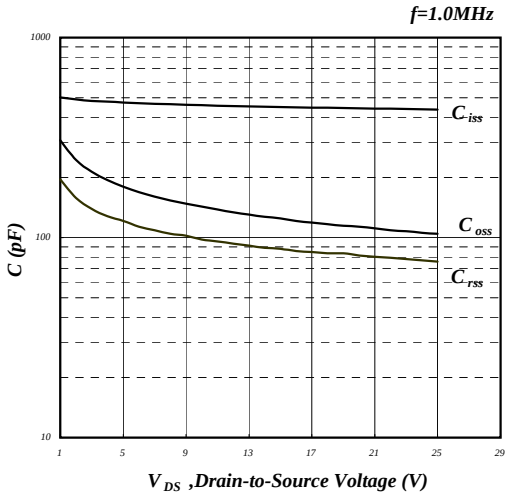


Fig 8. Typical Capacitance Characteristics

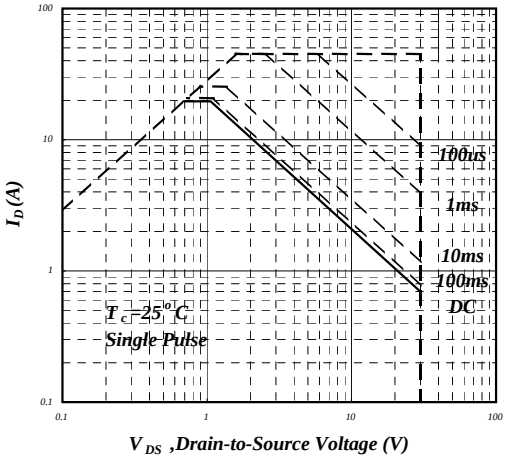


Fig 9. Maximum Safe Operating Area

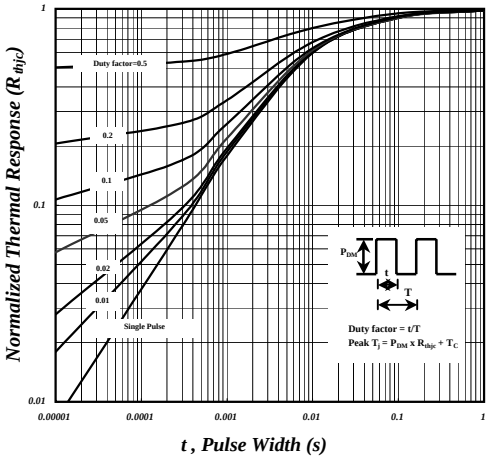


Fig 10. Effective Transient Thermal Impedance

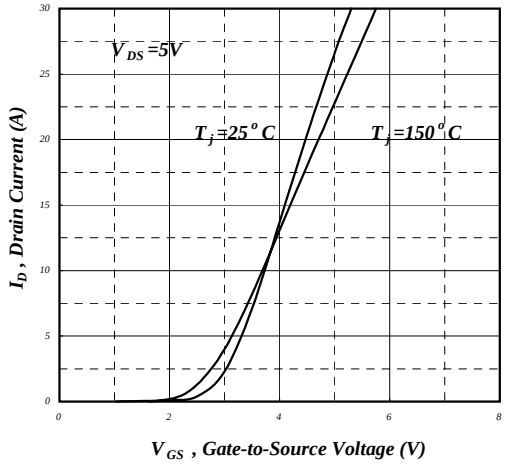


Fig 11. Transfer Characteristics

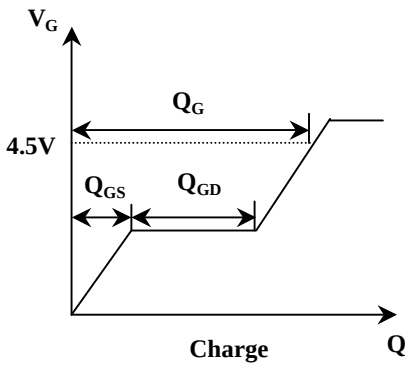
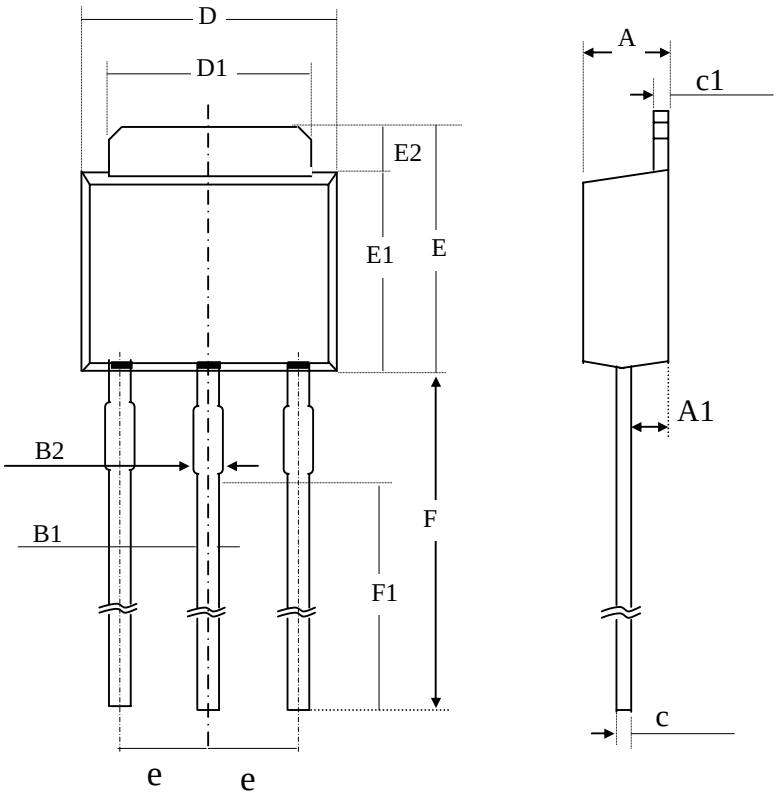


Fig 12. Gate Charge Waveform

PHYSICAL DIMENSIONS: TO-251 (I-PAK)

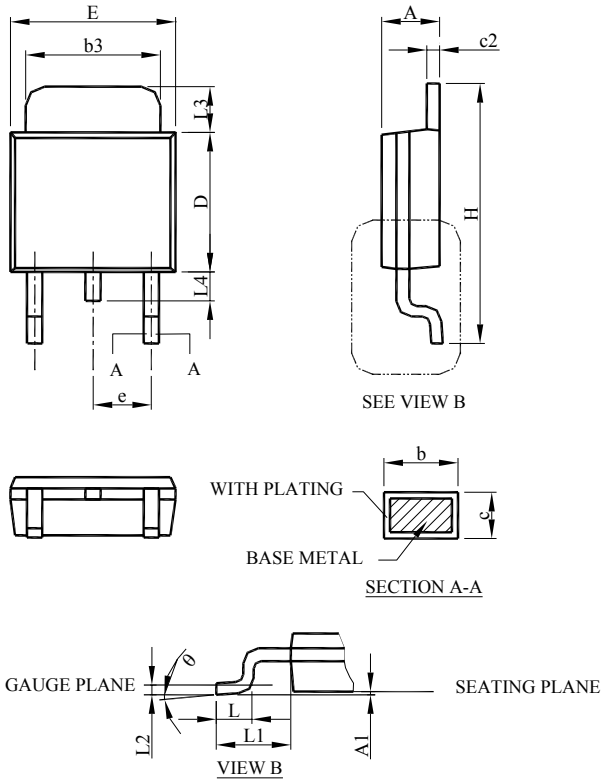


SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	2.20	2.30	2.40
A1	0.90	1.20	1.50
B1	0.50	0.60	0.70
B2	0.60	0.72	0.90
c	0.45	0.50	0.60
c1	0.45	0.50	0.55
D	6.40	6.60	6.80
D1	5.20	5.35	5.50
E	6.80	7.00	7.20
E1	5.40	5.60	5.80
E2	1.40	1.50	1.60
e	--	2.30	--
F	7.20	7.50	7.80
F1	1.50	1.60	1.80

1.All dimensions are in millimeters.

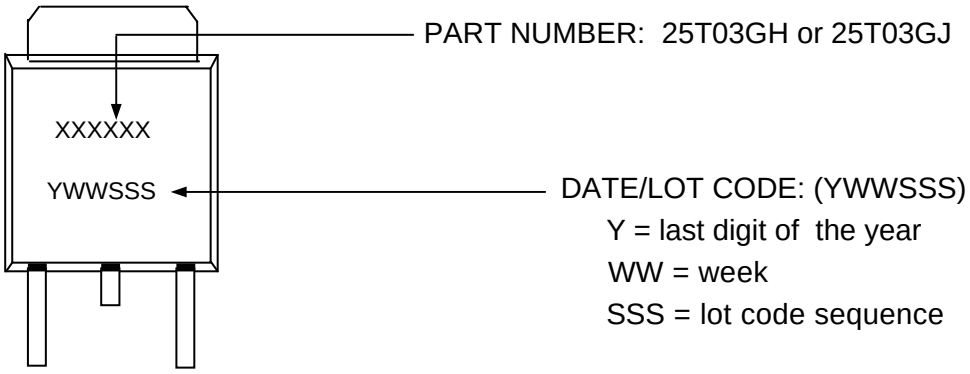
2.Dimensions do not include mold protrusions.

PHYSICAL DIMENSIONS: TO-252 (D-PAK)



SYMBOL	TO-252-3L	
	MILLIMETERS	
	MIN.	MAX.
A	1.80	2.80
A1	0.00	0.13
b	0.40	1.00
b3	4.80	5.90
c	0.35	0.65
c2	0.40	0.89
D	5.10	6.30
E	6.00	7.00
e	2.30 BSC	
H	7.80	11.05
L	1.00	2.55
L1	2.20	3.05
L2	0.35	0.65
L3	0.50	2.03
L4	0.50	1.20
θ	0°	8°

PART MARKING



PACKING: Moisture sensitivity level MSL3

TO-252: 3000 pcs in antistatic tape on a reel packed inside a moisture barrier bag (MBB).
TO-251: 1000pcs in tubes packed inside a moisture barrier bag (MBB).