V_{DSS}	60 V
I_D	5 A
$R_{DS(ON)}$	60 mΩ

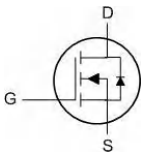
Description

These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

Features

60V,5A, RDS(ON)=60mΩ@VGS=10V
Improved dv/dt capability
Fast switching
Green Device Available

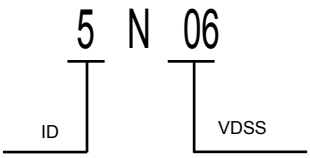
Equivalent Circuit





SOT-89-3L top view





MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	±20	V
I_D	Drain Current – Continuous (T_A=25°C)	5.0	A
	Drain Current – Continuous (T_A=100°C)	3.4	A
I_{DM}	Drain Current – Pulsed[1]	15	A
P_D	Power Dissipation (T_A=25°C)	1.35	W
	Power Dissipation – Derate above 25°C	0.011	W/°C
T_{STG}	Storage Temperature Range	-50 to 150	°C
T_J	Operating Junction Temperature Range	-50 to 150	°C

Thermal Characteristics

Parameter	Typ.	Max.	Unit
$R_{\theta JA}$ Thermal Resistance Junction to ambient	---	85	°C/W

ELECTRICAL CHARACTERISTICS (TA = 25°C unless otherwise noted.)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	60	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.06	---	V/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=60V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=48V , V_{GS}=0V , T_J=125℃	---	---	10	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V , I_D=4A	---	60	80	mΩ
		V_{GS}=4.5V , I_D=3A	---	70	90	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.0	1.5	2.5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-4.6	---	mV/℃

Dynamic and switching Characteristics

Q_g	Total Gate Charge[2,3]	V_{DS}=30V , V_{GS}=10V , I_D=10A	---	16.4	---	nC
Q_{gs}	Gate-Source Charge[2,3]		---	3.1	---	
Q_{gd}	Gate-Drain Charge[2,3]		---	3.7	---	
$T_{d(on)}$	Turn-On Delay Time[2,3]	V_{DD}=30V , V_{GS}=10V , R_G=6Ω I_D=1A	---	4.6	---	ns
T_r	Rise Time[2,3]		---	14.8	---	
$T_{d(off)}$	Turn-Off Delay Time[2,3]		---	27.2	---	
T_f	Fall Time[2,3]		---	7.8	---	
C_{iss}	Input Capacitance	V_{DS}=30V , V_{GS}=0V , F=1MHz	---	900	---	pF
C_{oss}	Output Capacitance		---	80	---	
C_{rss}	Reverse Transfer Capacitance		---	52	---	

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	5.0	A
I_{SM}	Pulsed Source Current		---	---	10	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1.2	V

Note :
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=50V,V_{GS}=10V,L=0.1mH,I_{AS}=23A.,R_G=25Ω, Starting T_J=25℃
3. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
4. Essentially independent of operating temperature.

RATING AND CHARACTERISTIC CURVES

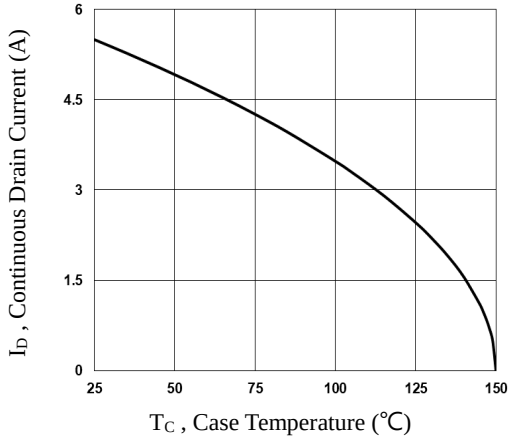


Fig.1 Continuous Drain Current vs. T_C

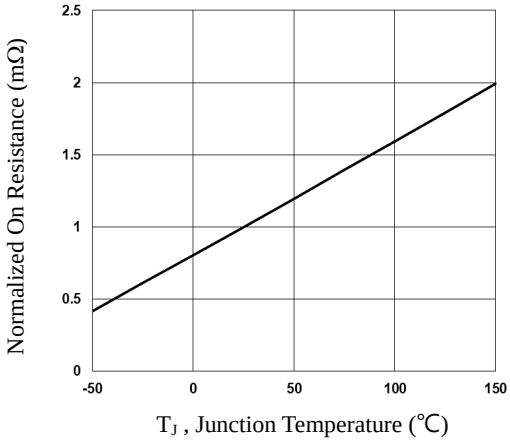


Fig.2 Normalized RDSON vs. T_J

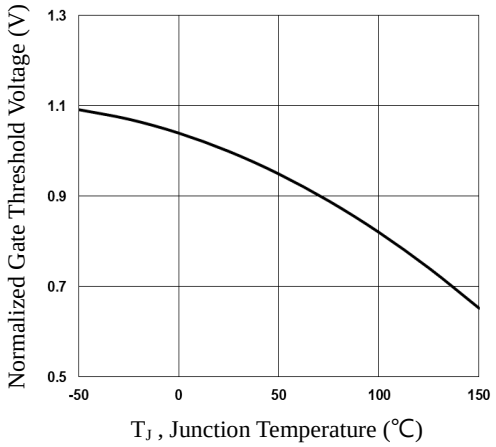


Fig.3 Normalized V_{th} vs. T_J

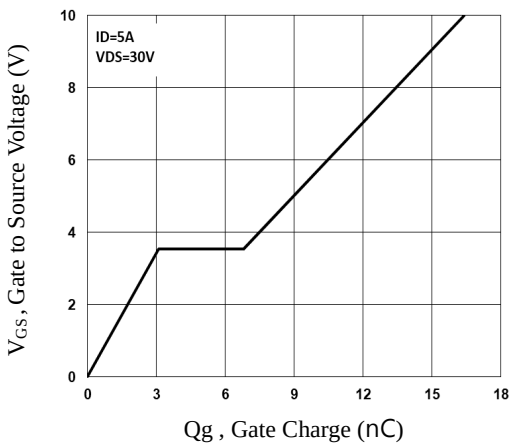


Fig.4 Gate Charge Waveform

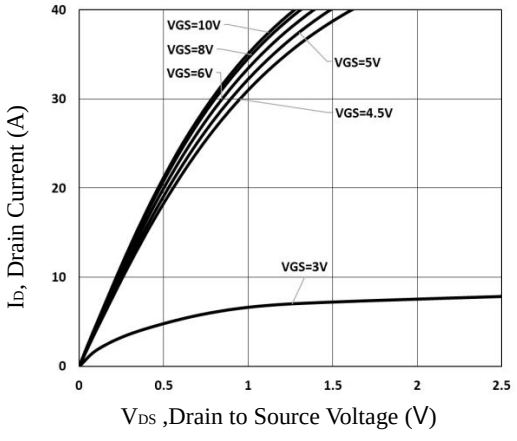


Fig.5 Typical Output Characteristics

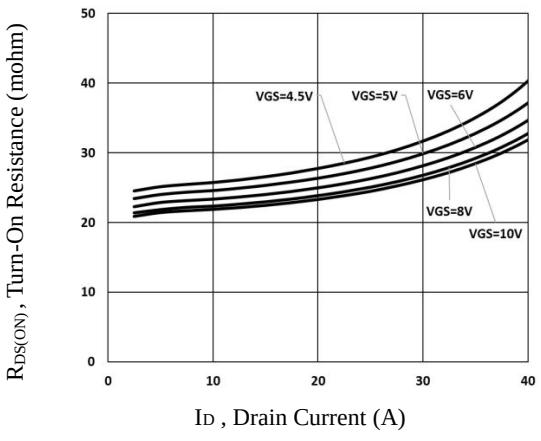


Fig.6 Turn-On Resistance vs. I_D

RATING AND CHARACTERISTIC CURVES

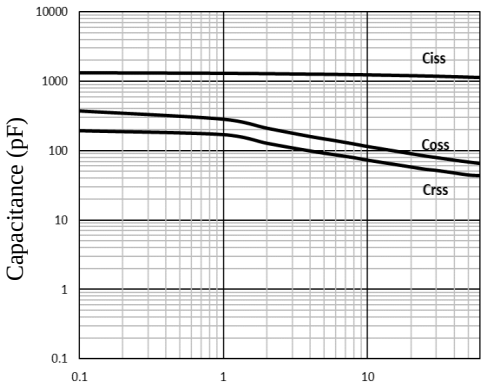


Fig.7 Capacitance Characteristics

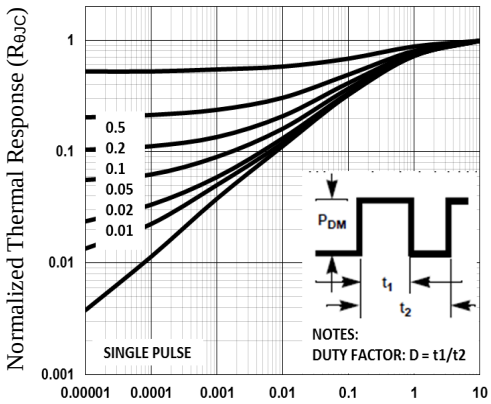


Fig.8 Normalized Transient Impedance

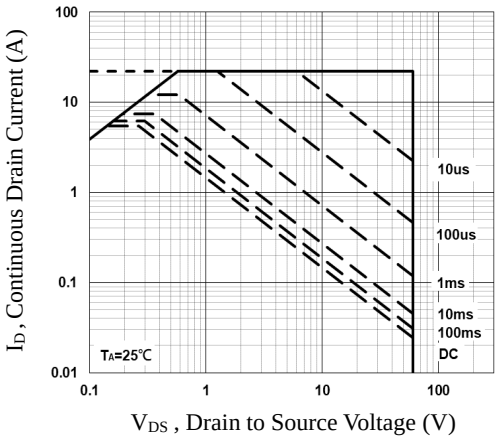


Fig.9 Maximum Safe Operation Area

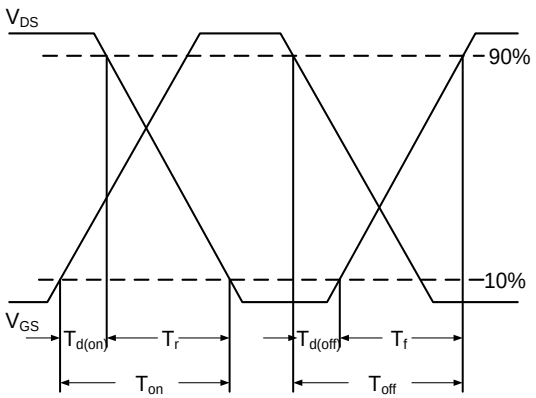
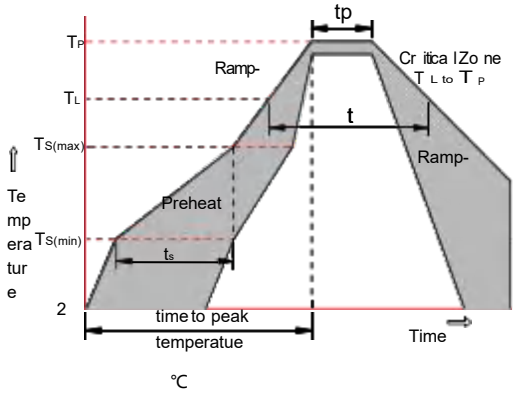


Fig.10 Switching Time Waveform

Soldering parameters

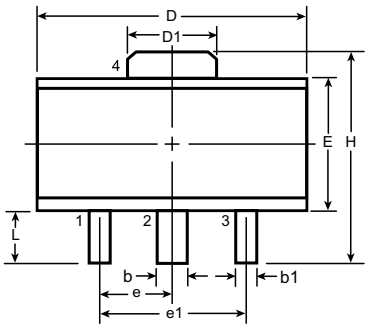
Reflow Condition		Pb-Free assembly (see as bellow)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150℃
	-Temperature Max($T_{s(max)}$)	+200℃
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3℃/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3℃/sec. Max
Reflow	-Temperature(T_L)(Liquid us)	+217℃
	-Temperature(t_L)	60-150 secs.
Peak Temp (T_p)		+260(+0/-5)℃
Time within 5℃ of actual Peak Temp (t_p)		30 secs. Max
Ramp-down Rate		6℃/sec. Max
Time 25℃ to Peak Temp (T_P)		8 min. Max
Do not exceed		+260℃

FIG5: Reflow condition

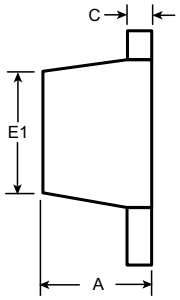


Package Dimensions & Suggested Pad Layout

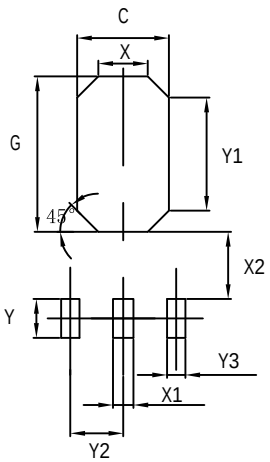
SOT89



Top View



Side View

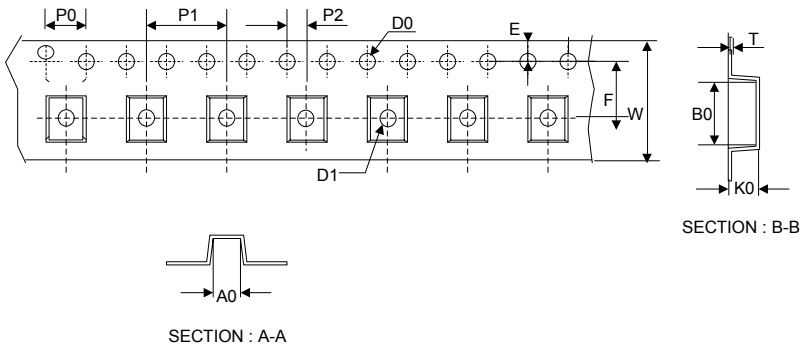


Symbol		A	b	b1	C	D	D1	E	E1	e	e1	H	L
Dimensions (mm)	MIN	1.40	0.44	0.36	0.3	4.40	1.50	2.29	2.00	1.50 BSC	3.00 BSC	3.94	0.89
	NOM	-	-	-	-	-	-	-	-			-	-
	MAX	1.60	0.56	0.48	0.5	4.60	1.75	2.60	2.29			4.25	1.20

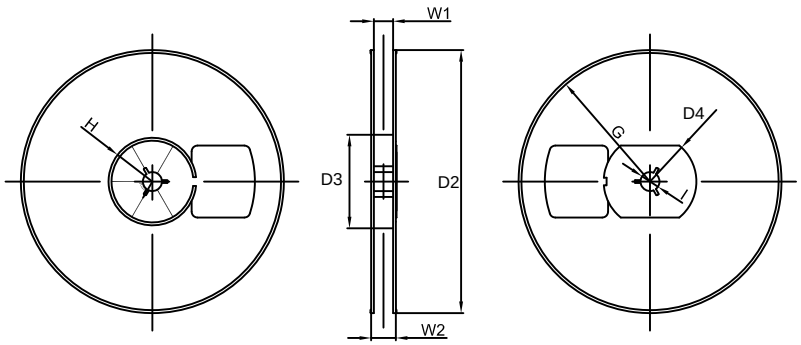
Dimensions	Value (in mm)
C	2.50
G	3.60
X	1.40
X1	0.90
X2	0.90
Y	1.40
Y1	2.60
Y2	1.50
Y3	0.90

Tape & rell specification

Tape



13” Reel



Symbol	Dimension (mm)
P0	4.00±0.20
P1	8.00±0.20
P2	2.00±0.20
D0	1.60±0.20
D1	1.60±0.20
E	1.75±0.20
F	7.50±0.15
W	16.00±0.20
A0	6.30±0.20
B0	8.25±0.20
K0	2.60±0.20
T	0.23±0.10
D2	180.0±5.0
D3	60Min.
D4	R32.0±2.0
G	R86.5±2.0
H	R30.0±2.0
I	13.0±2.0
W1	13.20±2.0
W2	16.50±2.0
Quantity: 1000PCS	