

IPD031N06L3GATMA1-VB Datasheet

TO252 SGT 60V Single-N MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω) MAX.	I _D (A)	Q _g (TYP.)
60	0.003atV _{GS} =10V	120	35nC

FEATURES

- SGT technology Power MOSFET
- Maximum 175 °C junction temperature
- 100 % R_g and UIS tested

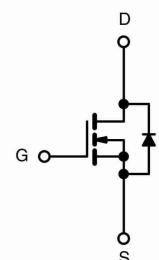


RoHS
COMPLIANT
HALOGEN
FREE

TO-252



Top View



N-Channel MOSFET

APPLICATIONS

- Power supplies:
 - Uninterruptible power supplies
 - AC/DC switch-mode power supplies
 - Lighting
- Synchronous rectification
- DC/DC converter
- Motor drive switch
- DC/AC inverter
- Solar micro inverter
- Class D audio amplifier

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V _{DS}	60	V
Gate-Source Voltage	V _{GS}	± 20	
Continuous Drain Current (T _J = 150 °C)	I _D	120	A
		95	
Pulsed Drain Current (t = 100 μs)	I _{DM}	360	A
Avalanche Current	I _{AS}	58	
Single Avalanche Energy ^a	E _{AS}	600	mJ
Maximum Power Dissipation ^a	P _D	150 ^b	W
		57 ^b	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	-55 to +175	°C

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-Ambient (PCB Mount) ^c	R _{thJA}	40	°C/W
Junction-to-Case (Drain)	R _{thJC}	1.3	

Notes

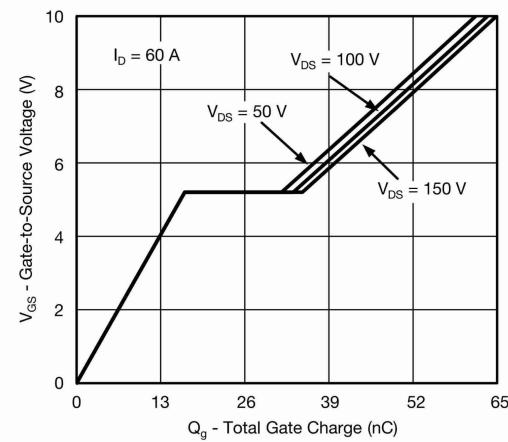
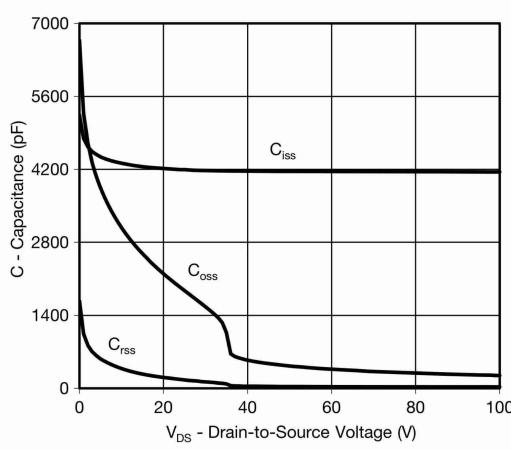
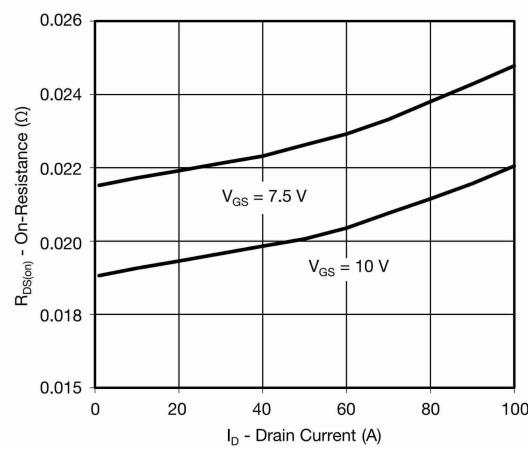
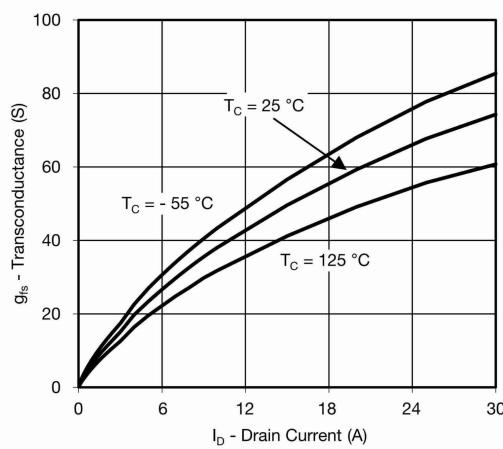
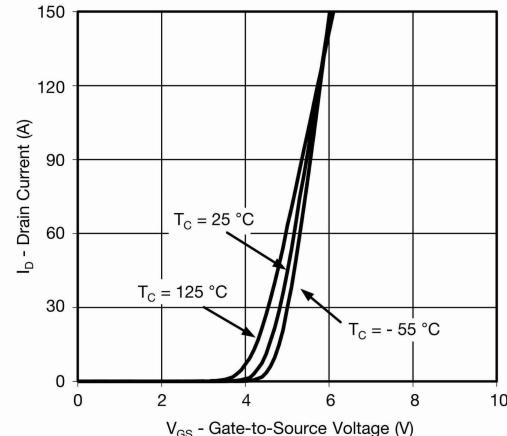
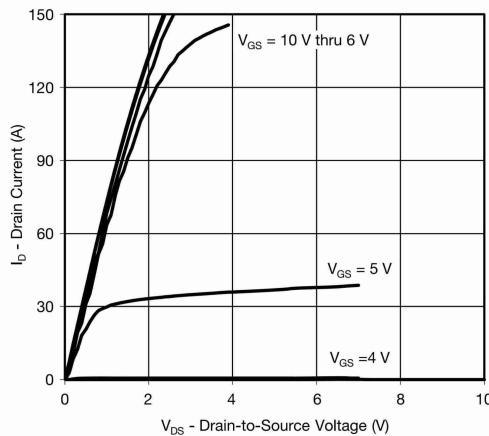
- a. Duty cycle ≤ 1 %.
- b. See SOA curve for voltage derating.
- c. When mounted on 1" square PCB (FR4 material).

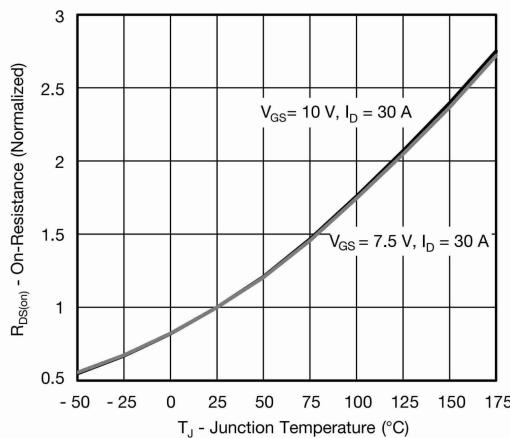
SPECIFICATIONS ($T_J = 25^\circ\text{C}$, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0 \text{ V}$, $I_D = 250 \mu\text{A}$	60	-	-	V
Gate Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$, $I_D = 250 \mu\text{A}$	2.5	-	4.5	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0 \text{ V}$, $V_{GS} = \pm 20 \text{ V}$	-	-	± 250	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 60 \text{ V}$, $V_{GS} = 0 \text{ V}$	-	-	1	μA
		$V_{DS} = 60 \text{ V}$, $V_{GS} = 0 \text{ V}$, $T_J = 125^\circ\text{C}$	-	-	150	
		$V_{DS} = 60 \text{ V}$, $V_{GS} = 0 \text{ V}$, $T_J = 175^\circ\text{C}$	-	-	5	mA
On-State Drain Current ^a	$I_{D(\text{on})}$	$V_{DS} \geq 10 \text{ V}$, $V_{GS} = 10 \text{ V}$	90	-	-	A
Drain-Source On-State Resistance ^a	$R_{DS(\text{on})}$	$V_{GS} = 10 \text{ V}$, $I_D = 20 \text{ A}$	-	0.003	-	Ω
		$V_{GS} = 4.5 \text{ V}$, $I_D = 40 \text{ A}$	-	0.015	-	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15 \text{ V}$, $I_D = 20 \text{ A}$	-	75	-	S
Dynamic ^b						
Input Capacitance	C_{iss}	$V_{GS} = 0 \text{ V}$, $V_{DS} = 60 \text{ V}$, $f = 1 \text{ MHz}$	-	8600	-	pF
Output Capacitance	C_{oss}		-	246	-	
Reverse Transfer Capacitance	C_{rss}		-	21	-	
Total Gate Charge ^c	Q_g	$V_{DS} = 60 \text{ V}$, $V_{GS} = 10 \text{ V}$, $I_D = 60 \text{ A}$	-	35	96	nC
Gate-Source Charge ^c	Q_{gs}		-	16.7	-	
Gate-Drain Charge ^c	Q_{gd}		-	16.9	-	
Gate Resistance	R_g	$f = 1 \text{ MHz}$	1.5	3	5	Ω
Turn-On Delay Time ^c	$t_{d(\text{on})}$	$V_{DD} = 60 \text{ V}$, $R_L = 1.66 \Omega$ $I_D \geq 60 \text{ A}$, $V_{GEN} = 10 \text{ V}$, $R_g = 1 \Omega$	-	21	20	ns
Rise Time ^c	t_r		-	123	206	
Turn-Off Delay Time ^c	$t_{d(\text{off})}$		-	33	63	
Fall Time ^c	t_f		-	84	156	
Drain-Source Body Diode Ratings and Characteristics ^b ($T_C = 25^\circ\text{C}$)						
Pulsed Current ($t = 100 \mu\text{s}$)	I_{SM}	$I_F = 10 \text{ A}$, $V_{GS} = 0 \text{ V}$ $I_F = 30 \text{ A}$, $di/dt = 100 \text{ A}/\mu\text{s}$	-	-	360	A
Forward Voltage ^a	V_{SD}		-	0.8	1.2	V
Reverse Recovery Time	t_{rr}		-	215	430	ns
Peak Reverse Recovery Charge	$I_{RM(\text{REC})}$		-	11	20	A
Reverse Recovery Charge	Q_{rr}		-	0.9	1.8	μC

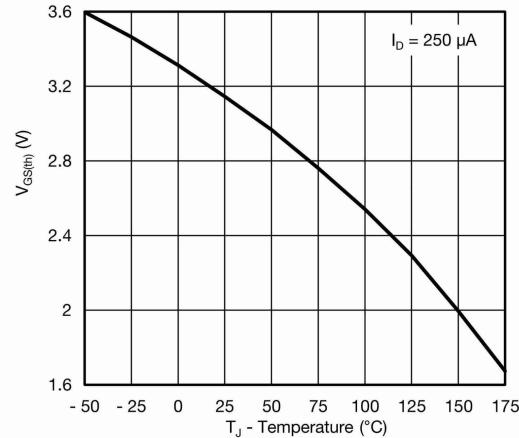
Notes

- a. Pulse test; pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2 \%$.
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.

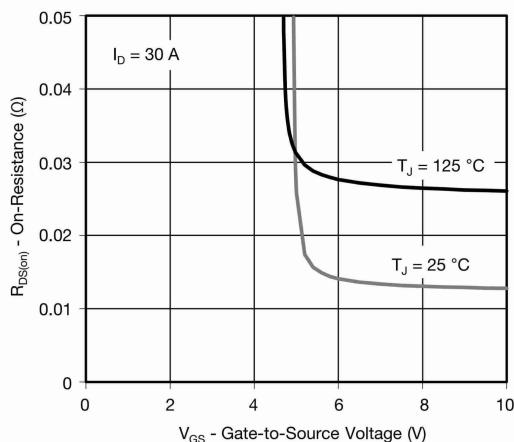
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise noted)


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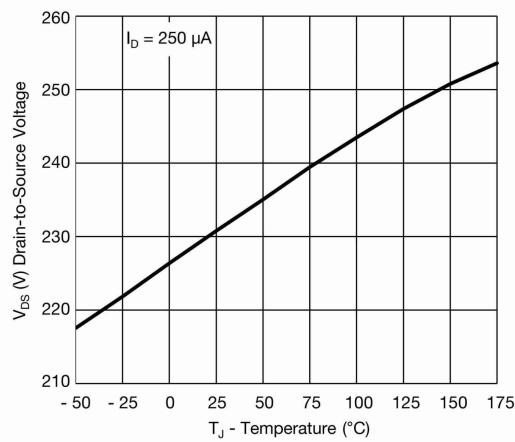
On-Resistance vs. Junction Temperature



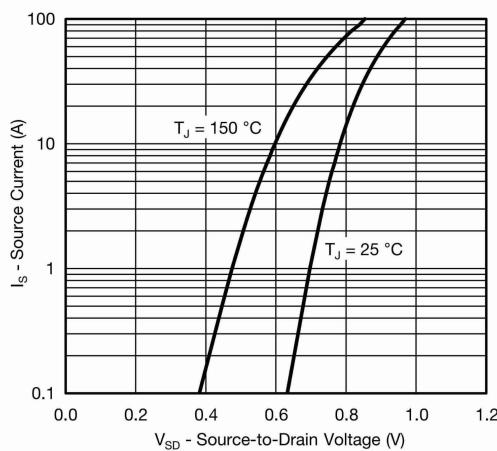
Threshold Voltage



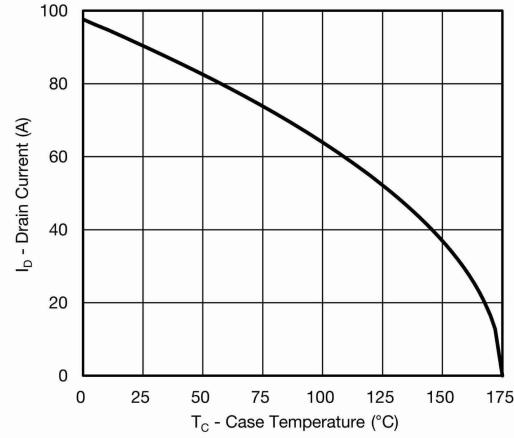
On-Resistance vs. Gate-to-Source Voltage



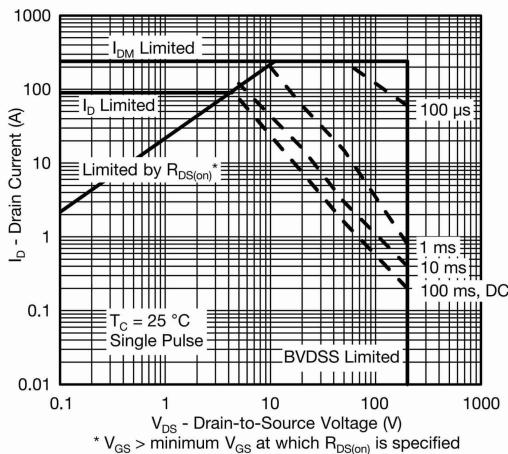
Drain Source Breakdown vs. Junction Temperature



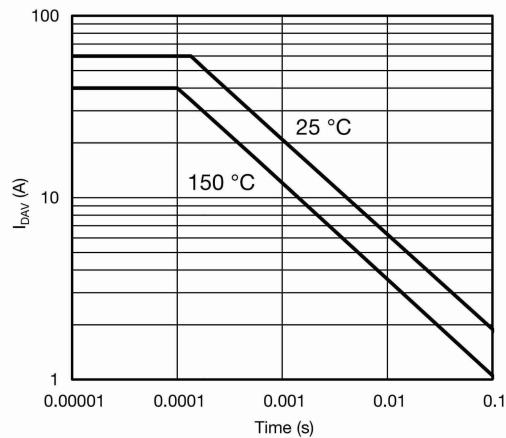
Source Drain Diode Forward Voltage



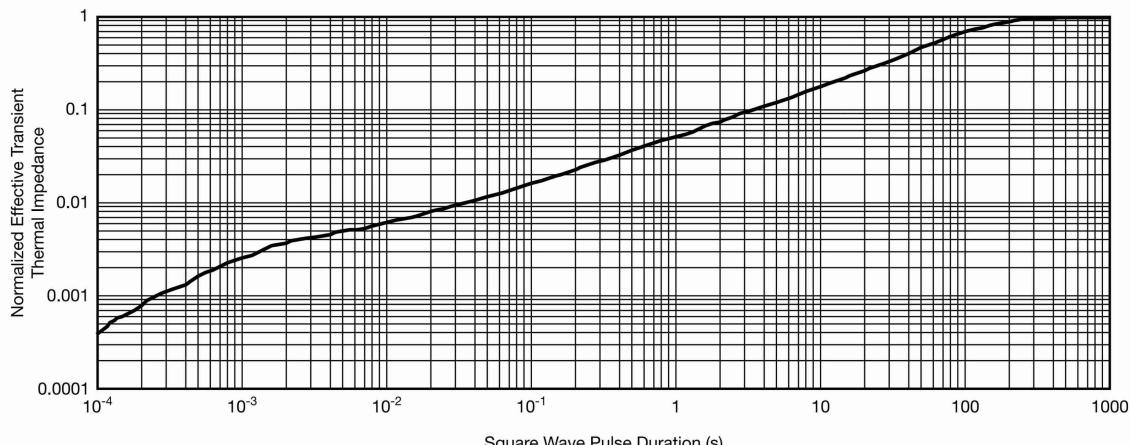
Current De-rating

THERMAL RATINGS ($T_A = 25^\circ\text{C}$, unless otherwise noted)


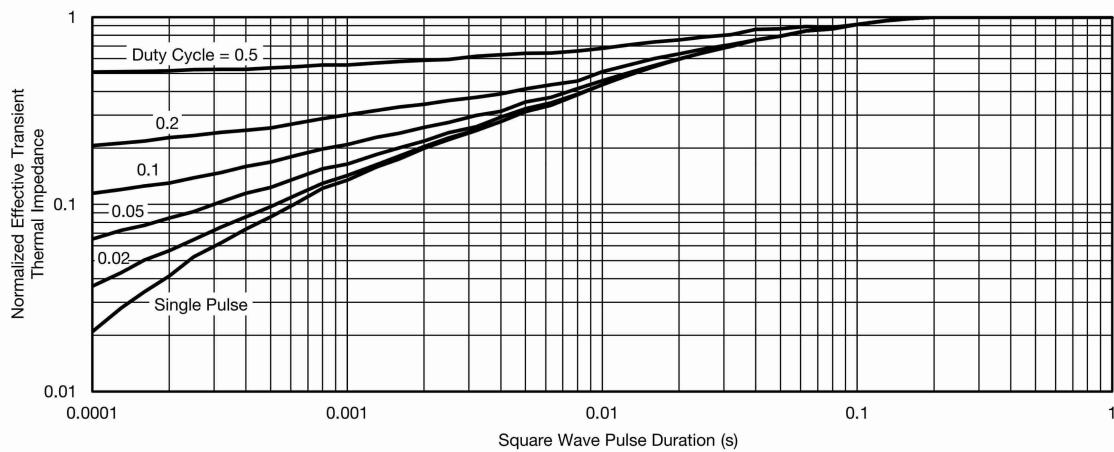
Safe Operating Area



Single Pulse Avalanche Current Capability vs. Time



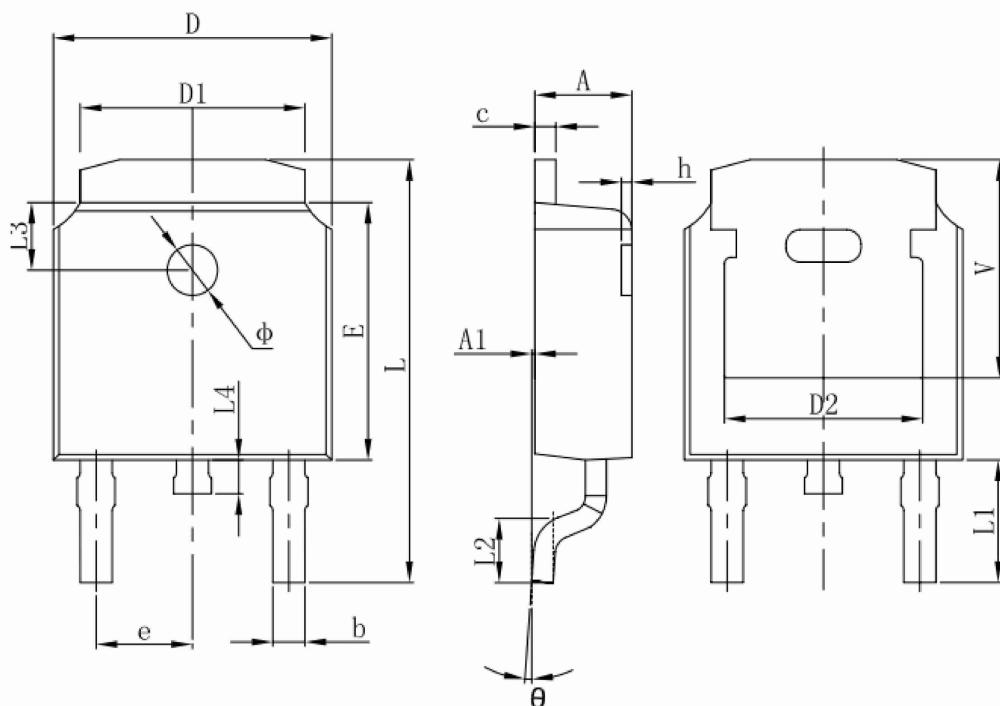
Normalized Thermal Transient Impedance, Junction-to-Ambient

THERMAL RATINGS ($T_A = 25^\circ\text{C}$, unless otherwise noted)

Normalized Thermal Transient Impedance, Junction-to-Case
Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction to Ambient (25°C)
 - Normalized Transient Thermal Impedance Junction to Case (25°C)

are given for general guidelines only to enable the user to get a "ball park" indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

TO252 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.635	0.770	0.025	0.030
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.712	10.312	0.382	0.406
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.250 REF.		0.207 REF.	

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