



Product Specification

产品规格手册

50N06-Q

50A, 60V N-CHANNEL POWER MOSFET

50A-60V N沟道功率MOS管

50A, 60V N-CHANNEL POWER MOSFET

■ DESCRIPTION

The **50N06-Q** is an N-channel power MOSFET using NSD's advanced technology to provide customers with a minimum on-state resistance and superior switching performance.

The **50N06-Q** is generally applied in low power switching mode power appliances and electronic ballast.

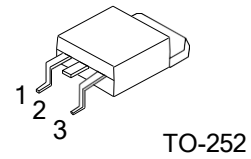
■ FEATURES

* $R_{DS(ON)} \leq 15 \text{ m}\Omega$ @ $V_{GS}=10\text{V}$, $I_D=25\text{A}$

$R_{DS(ON)} \leq 20 \text{ m}\Omega$ @ $V_{GS}=4.5\text{V}$, $I_D=25\text{A}$

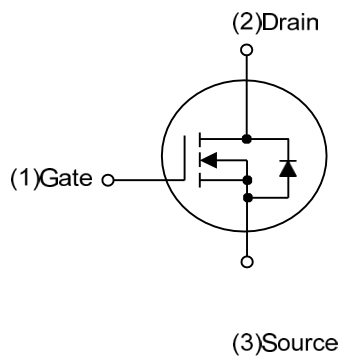
* High Switching Speed

* Improved dv/dt capability



1: Gate 2: Drain 3: Source

■ SYMBOL



■ ABSOLUTE MAXIMUM RATINGS (($T_C=25^{\circ}\text{C}$, unless otherwise specified))

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	60	V
Gate-Source Voltage		V_{GSS}	± 20	V
Continuous Drain Current		I_D	50	A
Pulsed Drain Current (Note 2)		I_{DM}	100	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	32	mJ
Peak Diode Recovery dv/dt		dv/dt	2.9	V/ns
Power Dissipation	TO-220/TO-263	P_D	120	W
	TO-220F/TO-220F1		36	W
	TO-251/TO-252 TO-252D		51	W
	PDFN5×6		25	W
Junction Temperature		T_J	+150	$^{\circ}\text{C}$
Operation and Storage Temperature		T_{STG}	-55 ~ +150	$^{\circ}\text{C}$

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Repetitive Rating: Pulse width limited by maximum junction temperature.

3. $L=0.1\text{mH}$, $I_{AS}=25\text{A}$, $V_{DD}=30\text{V}$, $R_G=20\Omega$, Starting $T_J=25^{\circ}\text{C}$

4. $I_{SD} \leq 30\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J=25^{\circ}\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-263	θ_{JA}	62.5	$^{\circ}\text{C}/\text{W}$
	TO-251/TO-252 TO-252D		110	$^{\circ}\text{C}/\text{W}$
	PDFN5×6		65	$^{\circ}\text{C}/\text{W}$
Junction to Case	TO-220/TO-263	θ_{JC}	1.04	$^{\circ}\text{C}/\text{W}$
	TO-220F/TO-220F1		3.47	$^{\circ}\text{C}/\text{W}$
	TO-251/TO-252 TO-252D		2.45 (Note)	$^{\circ}\text{C}/\text{W}$
	PDFN5×6		5 (Note)	$^{\circ}\text{C}/\text{W}$

Note: Device mounted on FR-4 substrate P_c board, 2oz copper, with 1inch square copper plate.

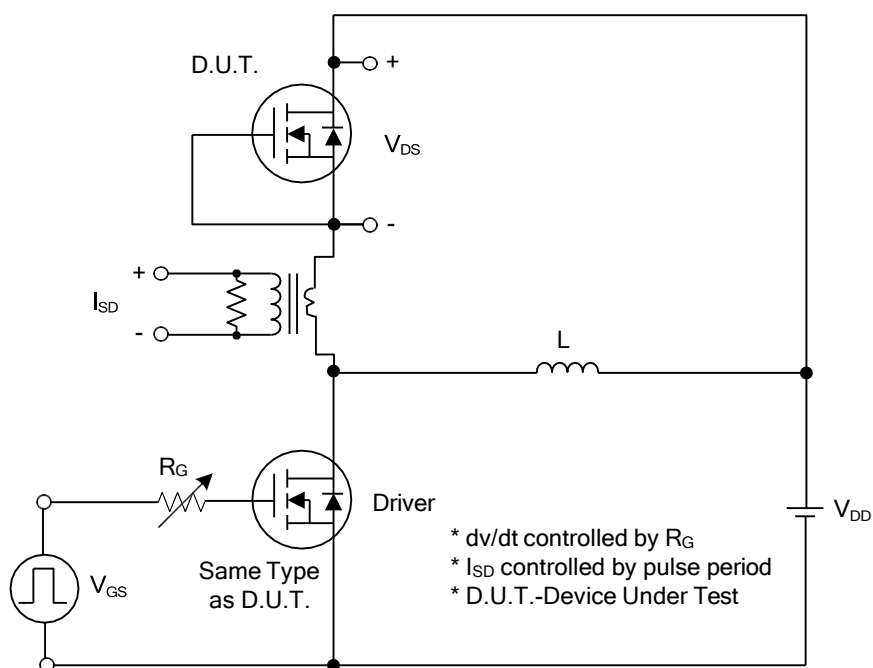
ELECTRICAL CHARACTERISTICS ($T_J=25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250μA	60			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =60V, V _{GS} =0V			10	μA
Gate-Source Leakage Current	Forward	I _{GSS}	V _{GS} =20V, V _{DS} =0V			100	nA
	Reverse		V _{GS} =-20V, V _{DS} =0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	1.0		3.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =25A			15	mΩ
			V _{GS} =4.5V, I _D =25A			20	mΩ
DYNAMIC CHARACTERISTICS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1MHz		2315		pF
Output Capacitance		C _{OSS}			181		pF
Reverse Transfer Capacitance		C _{RSS}			144		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge		Q _G	V _{DS} =48V, V _{GS} =10V, I _D =50A (Note1,2)		56		nC
Gate-Source Charge		Q _{GS}			8.4		nC
Gate-Drain Charge		Q _{GD}			16		nC
Turn-On Delay Time		t _{D(ON)}	V _{DS} =30V, V _{GS} =10V, I _D =50A, R _G =6Ω (Note1,2)		9		ns
Turn-On Rise Time		t _r			18		ns
Turn-Off Delay Time		t _{D(OFF)}			54		ns
Turn-Off Fall Time		t _f			28		ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Maximum Continuous Drain-Source Diode Forward Current		I _S				50	A
Maximum Pulsed Drain-Source Diode Forward Current		I _{SM}				100	A
Drain-Source Diode Forward Voltage		V _{SD}	I _S =50A, V _{GS} =0V			1.5	V
Body Diode Reverse Recovery Time		t _{rr}	I _S =30A, V _{GS} =0V,		60		ns
Body Diode Reverse Recovery Charge		Q _{rr}	di/dt=100A/μs		30		nC

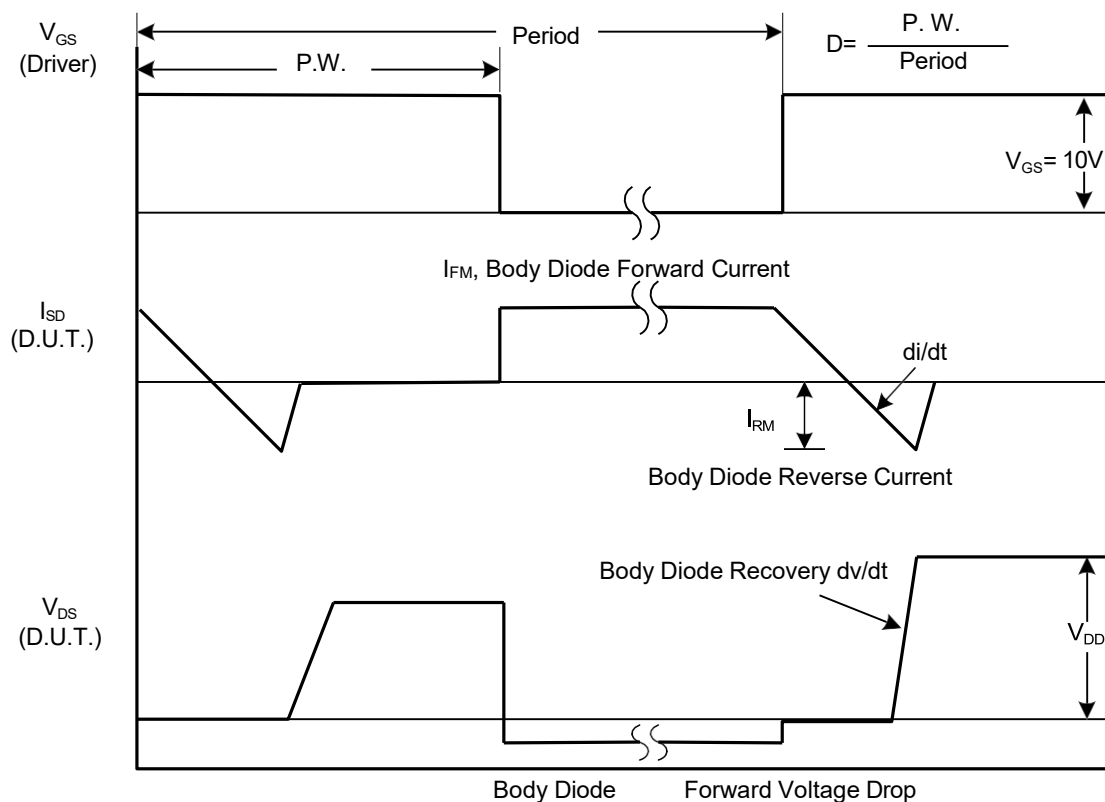
Notes: 1. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ **TEST CIRCUITS AND WAVEFORMS**



Peak Diode Recovery dv/dt Test Circuit



Peak Diode Recovery dv/dt Waveforms

■ **TEST CIRCUITS AND WAVEFORMS**

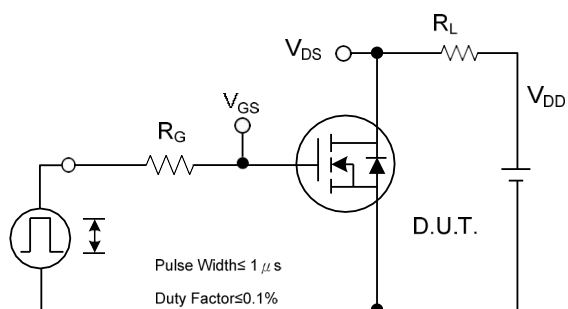


Fig. 2A Switching Test Circuit

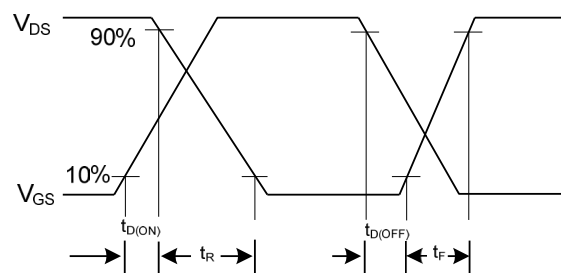


Fig. 2B Switching Waveforms

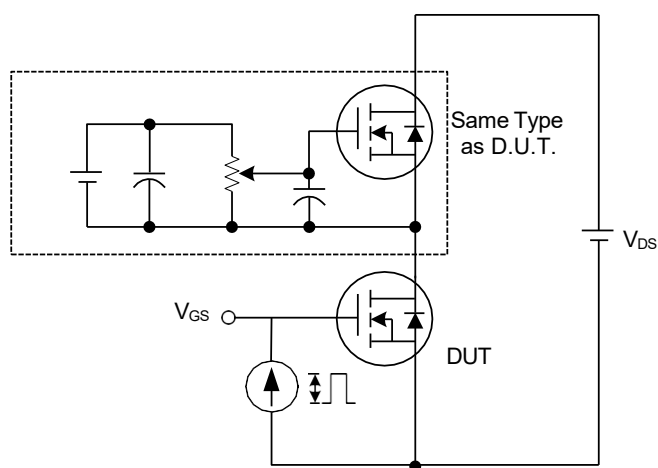


Fig. 3A Gate Charge Test Circuit

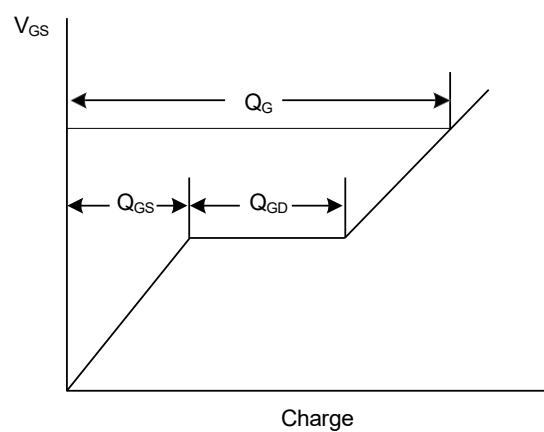


Fig. 3B Gate Charge Waveform

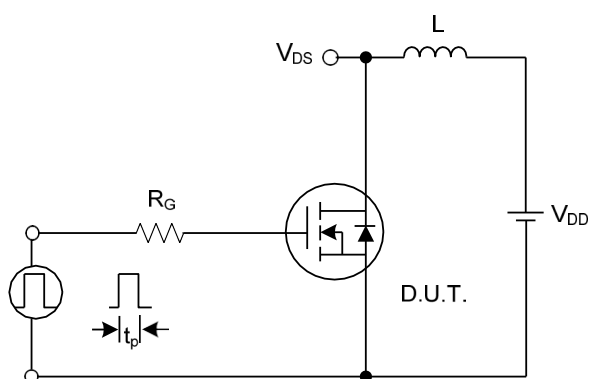


Fig. 4A Unclamped Inductive Switching Test Circuit

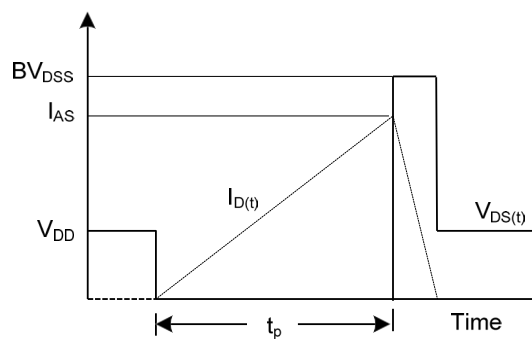
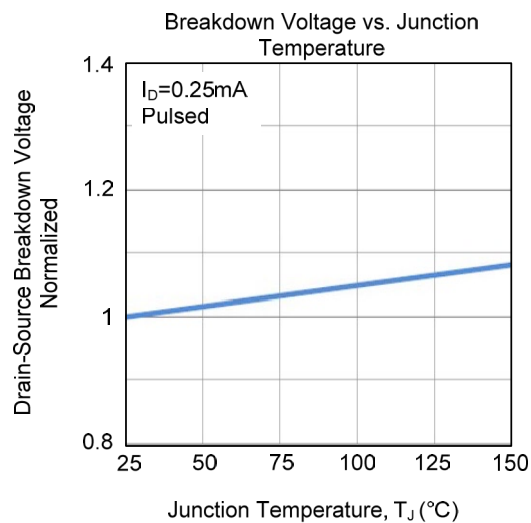
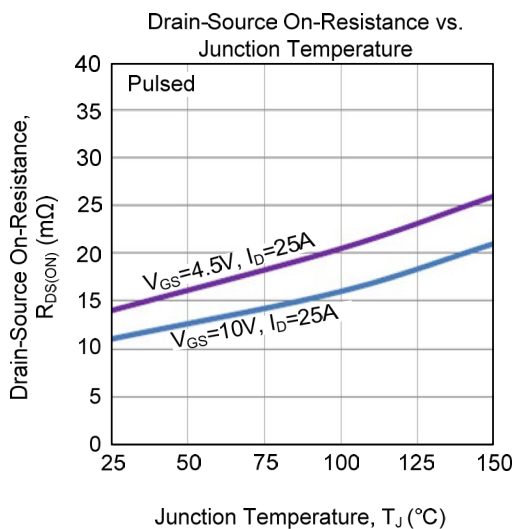
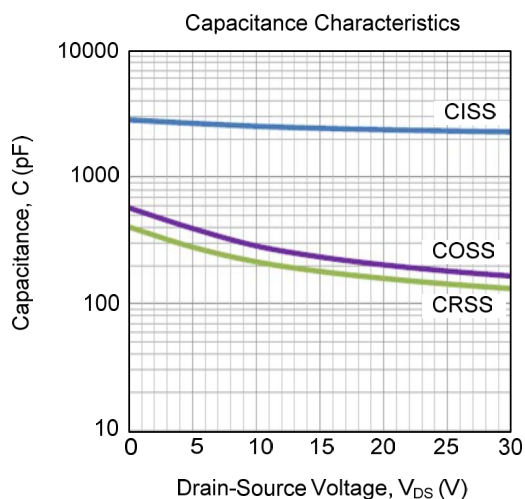
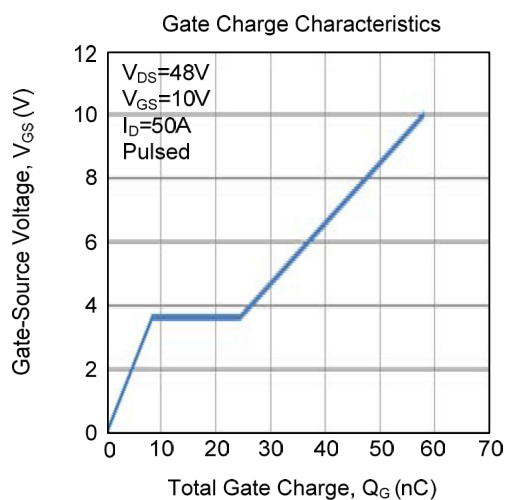
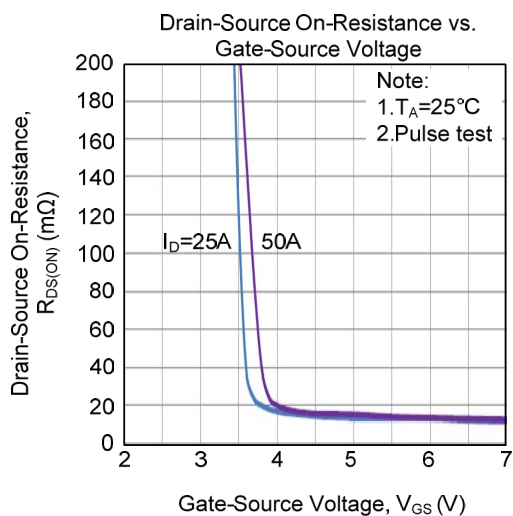
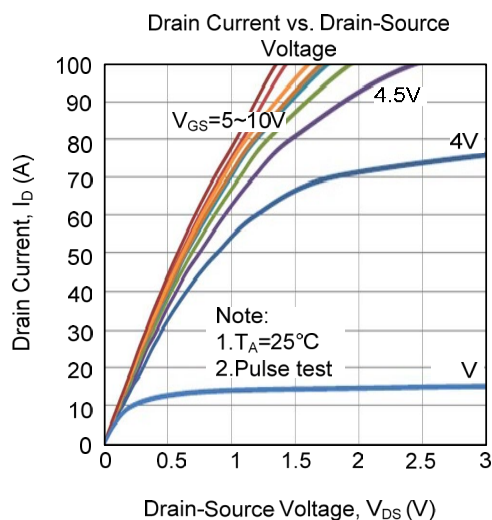


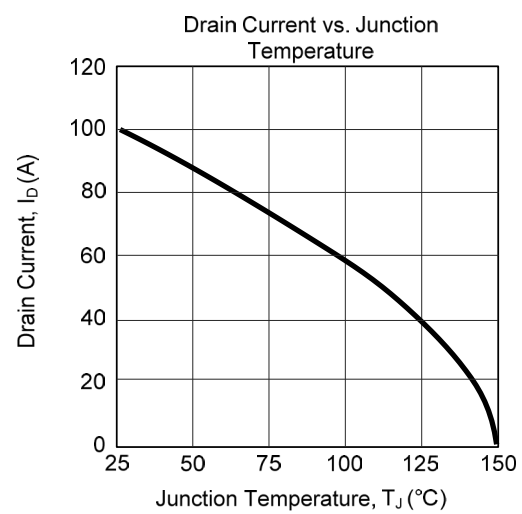
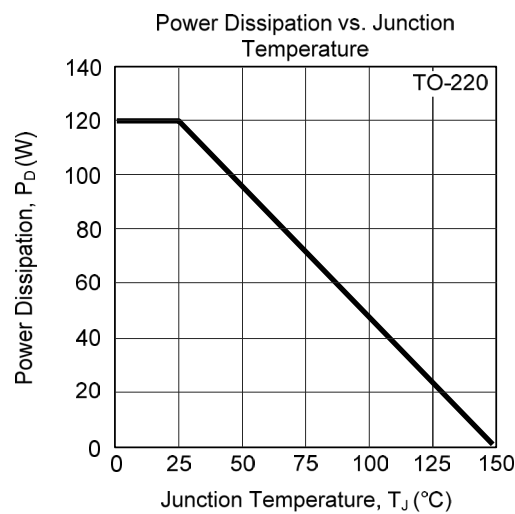
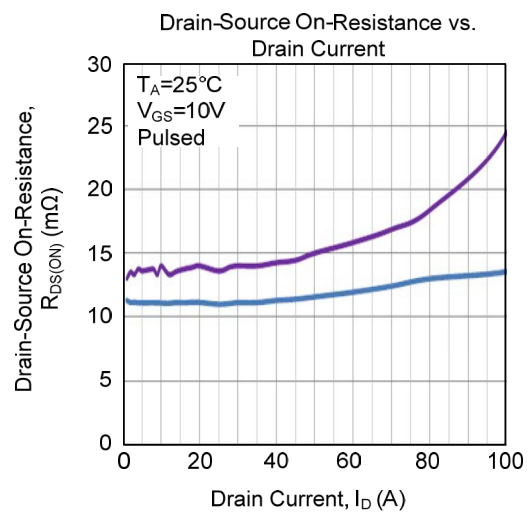
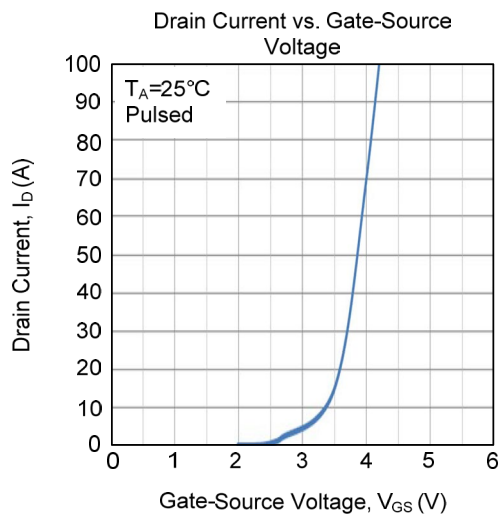
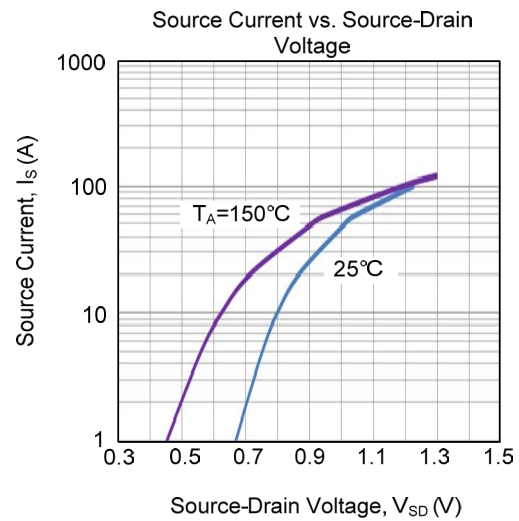
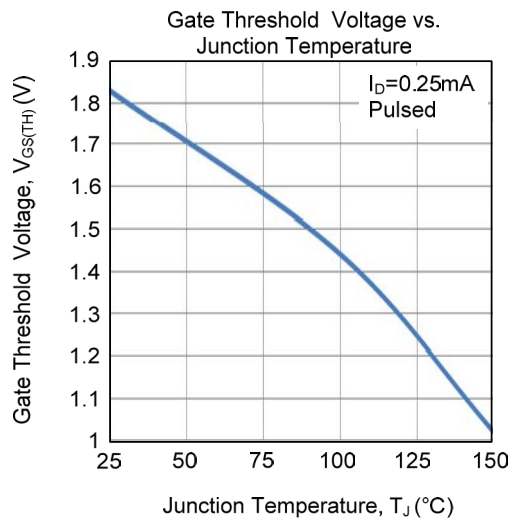
Fig. 4B Unclamped Inductive Switching Waveforms

■ **TYPICAL CHARACTERISTICS**



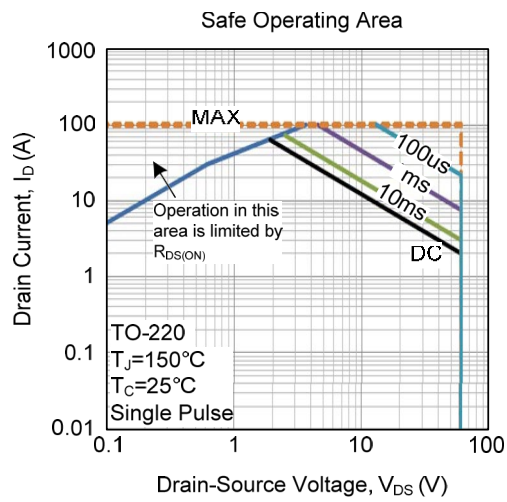


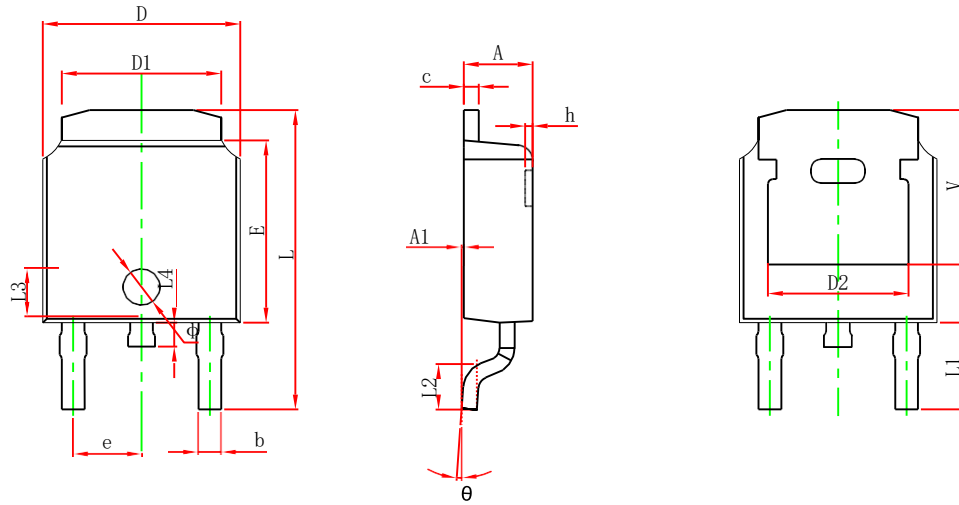
■ TYPICAL CHARACTERISTICS (Cont.)



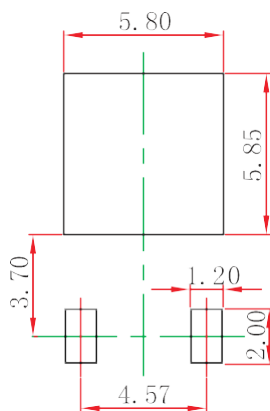


■ TYPICAL CHARACTERISTICS (Cont.)



Mechanical Information
TO-252-2L Mechanical Information
TO-252-2L Outline Dimensions


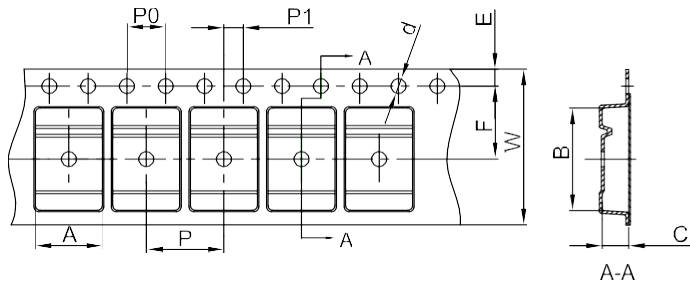
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.635	0.770	0.025	0.030
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	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.	

TO-252-2L Suggest Pad Layout

NOTE:

1. Controlling dimension: in millimeters.
2. General tolerance: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.

TO-252 Tape and Reel

TO-252 Embossed Carrier Tape

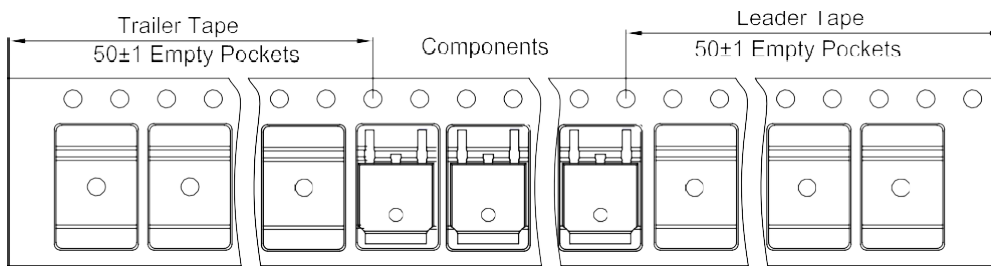


Packaging Description:

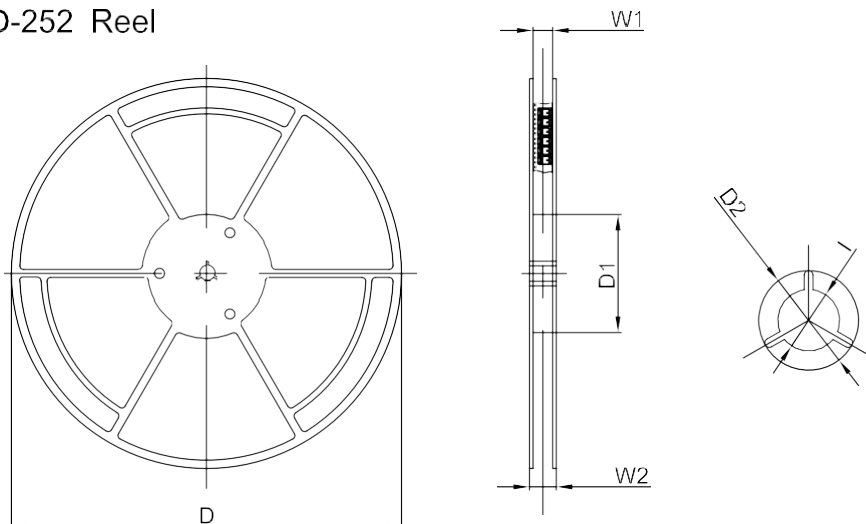
TO-252 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 25,00 units per 13" or 33.0 cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

Dimensions are in millimeter										
Pkg type	A	B	C	d	E	F	P0	P	P1	W
TO-252	6.90	10.50	2.70	Ø1.55	1.75	7.50	4.00	8.00	2.00	16.00

TO-252 Tape Leader and Trailer



TO-252 Reel



Dimensions are in millimeter						
Reel Option	D	D1	D2	W1	W2	I
13"Dia	330.00	100.00	Ø21.00	16.40	21.00	Ø13.00

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
2,500 pcs	13inch	2,500 pcs	340×336×29	25,000 pcs	353×346×365	