

N-Channel Enhancement Mode Power MOSFET

Features:

- Low On Resistance
- Simple Drive Requirement
- Low Gate Charge
- Fast Switching Characteristic
- RoHS compliant package
- Pb-free lead plating and halogen-free package

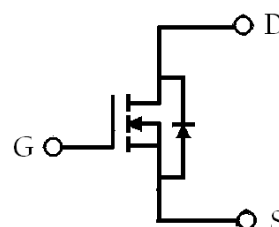
Outline

TO-252(DPAK)



Symbol

KWD5N50BJ3



G : Gate D : Drain S : Source

BV_{DSS}	500V
$I_D @ V_{GS}=10V, T_C=25^\circ C$	4.5A
$R_{DS(on)(TYP)} @ V_{GS}=10V, I_D=2.25A$	1.1Ω

Ordering Information

Device	Package	Shipping
KWD5N50BJ3	TO-252 (Pb-free lead plating and halogen-free package)	2500 pcs / Tape & Reel

Absolute Maximum Ratings (T_c=25°C)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V _{DS}	500	V
Gate-Source Voltage	V _{GS}	±30	
Continuous Drain Current @T _c =25°C, V _{GS} =10V	I _D	4.5	A
Continuous Drain Current @T _c =100°C, V _{GS} =10V		2.8	
Pulsed Drain Current (Note 1)	I _{DM}	18	
Single Pulse Avalanche Energy (Note 2)	E _{AS}	90	mJ
Avalanche Current (Note 1)	I _{AS}	4.5	A
Repetitive Avalanche Energy (Note 1)	E _{AR}	4.8	mJ
Maximum Temperature for Soldering @ Lead at 0.125 in(0.318mm) from case for 10 seconds	T _L	300	°C
Total Power Dissipation (T _A =25°C) (Note 4)	P _D	2	W
Total Power Dissipation (T _c =25°C)		48	W
Linear Derating Factor		0.38	W/°C
Operating Junction and Storage Temperature	T _j , T _{stg}	-55~+150	°C

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	R _{th,j-c}	2.6	°C/W
Thermal Resistance, Junction-to-ambient, max (Note 4)	R _{th,j-a}	50	
Thermal Resistance, Junction-to-ambient, max		110	

Note : 1.Repetitive rating; pulse width limited by maximum junction temperature.

2. I_{AS}=4.5A, V_{DD}=50V, L=8mH, R_G=25Ω, starting T_J=+25°C.

3. I_{SD}≤4.5A, dI/dt≤100A/μs, V_{DD}≤BV_{DSS}, starting T_J=+25°C.

4. When the device is mounted on 1 in² FR-4 board with 2 oz. copper, in a still air environment with T_A=25°C.

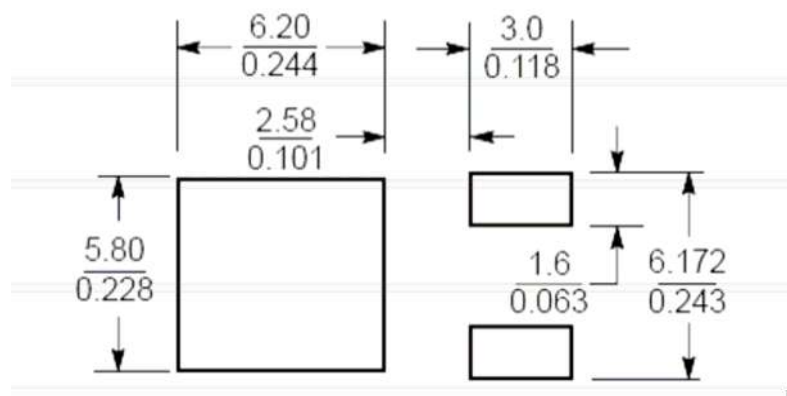
Characteristics (T_c=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	500	-	-	V	V _{GS} =0V, I _D =250μA, T _J =25°C
ΔBV _{DSS} /ΔT _J	-	0.6	-	V/°C	Reference to 25°C, I _D =250μA
V _{GS(th)}	2.0	-	4.0	V	V _{DS} = V _{GS} , I _D =250μA
*G _{FS}	-	5	-	S	V _{DS} = 15V, I _D =2.25A
I _{GSS}	-	-	±100	nA	V _{GS} =±30V
I _{DSS}	-	-	1	μA	V _{DS} = 500V, V _{GS} = 0V
	-	-	10		V _{DS} = 400V, V _{GS} = 0V, T _C =125°C
*R _{DS(ON)}	-	1.1	1.5	Ω	V _{GS} = 10V, I _D =2.25A
Dynamic					
*Q _g	-	17.4	-	nC	I _D =4.5A, V _{DD} =400V, V _{GS} =10V
*Q _{gs}	-	3.4	-		
*Q _{gd}	-	7.6	-		

*t _{d(ON)}	-	10.6	-	ns	V _{DD} =250V, I _D =4.5A, V _{GS} =10V, R _G =25Ω
*t _r	-	10	-		
*t _{d(OFF)}	-	35	-		
*t _f	-	31.2	-	pF	V _{GS} =0V, V _{DS} =25V, f=1MHz
C _{iss}	-	572	-		
C _{oss}	-	65	-		
C _{rss}	-	32	-		
Source-Drain Diode					
*I _S	-	-	4.5	A	
*I _{SM}	-	-	18		
*V _{SD}	-	-	1.5	V	I _S =4.5A, V _{GS} =0V
*t _{rr}	-	260	-	ns	V _{GS} =0, I _F =4.5A, dI _F /dt=100A/μs
*Q _{rr}	-	1.1	-	μC	

*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

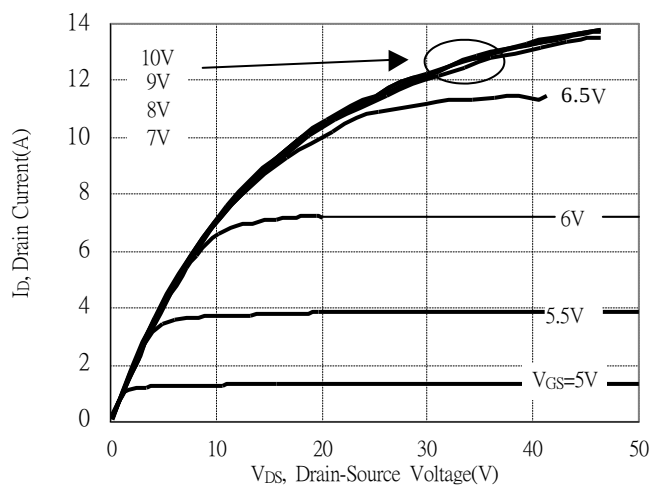
Recommended soldering footprint



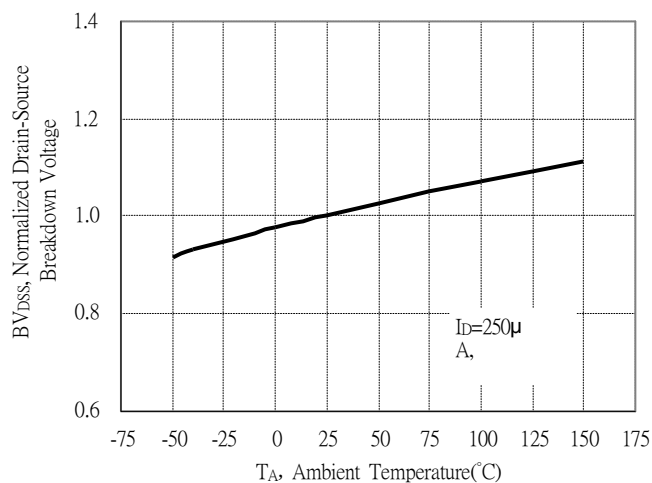
Unit ($\frac{\text{mm}}{\text{inch}}$)

Typical Characteristics

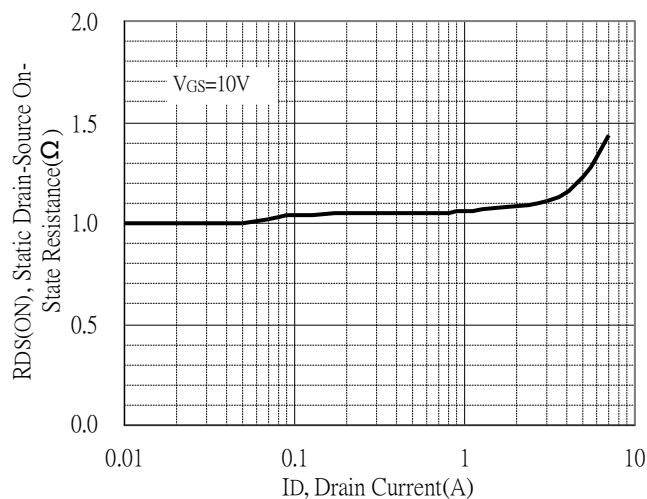
Typical Output Characteristics



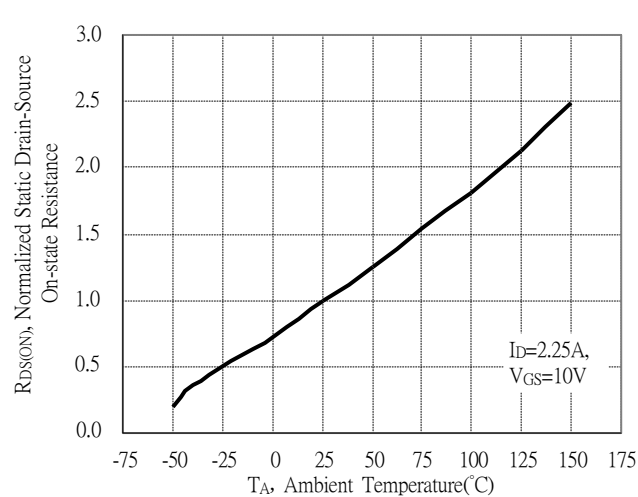
Breakdown Voltage vs Ambient Temperature



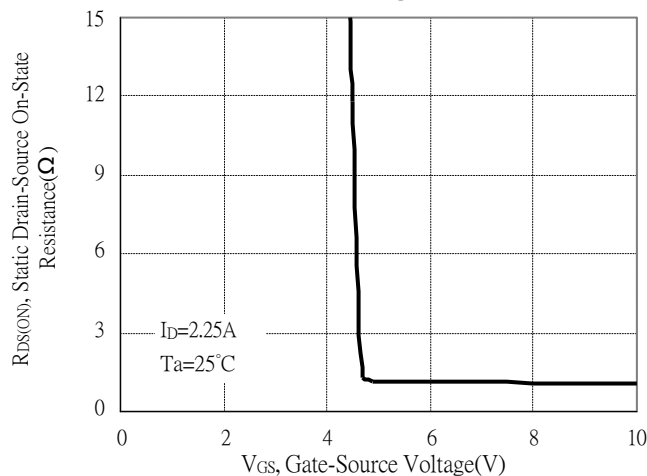
Static Drain-Source On-State resistance vs Drain Current



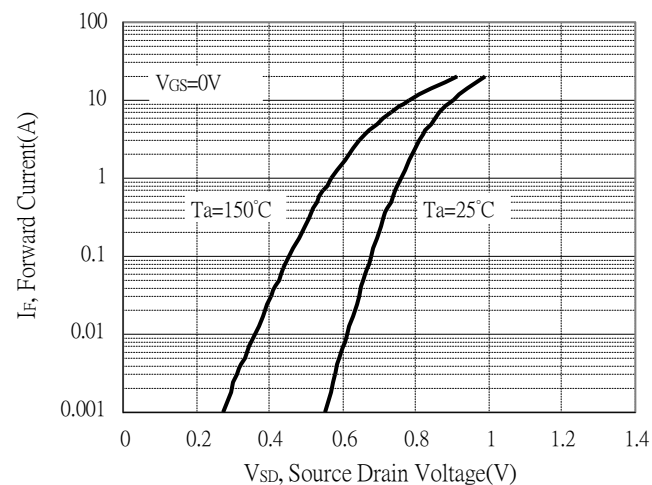
Static Drain-Source On-resistance vs Ambient Temperature



Static Drain-Source On-State Resistance vs Gate-Source Voltage

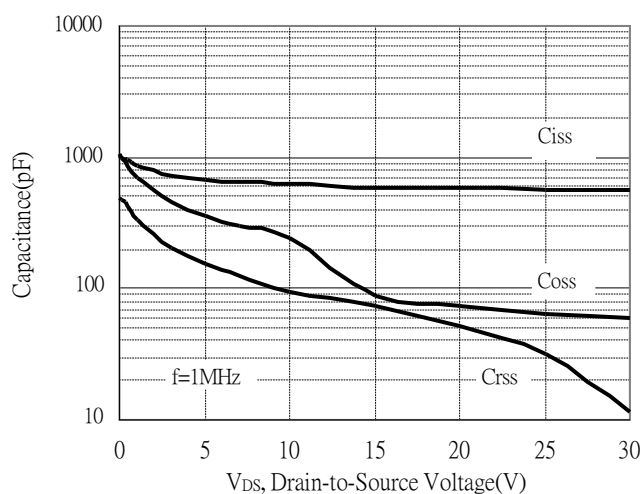


Forward Drain Current vs Source-Drain Voltage

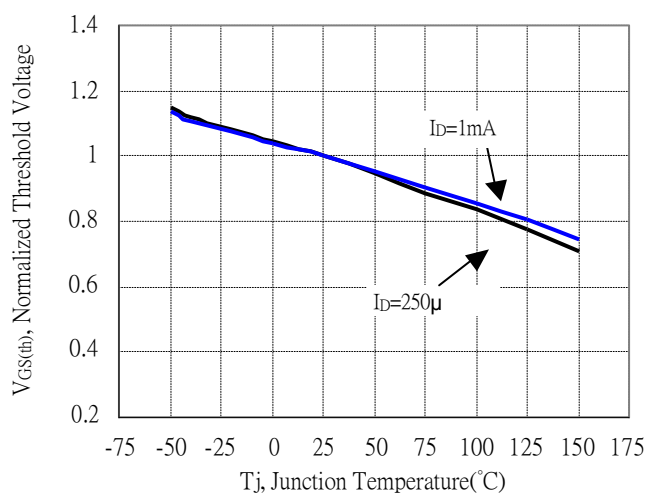


Typical Characteristics(Cont.)

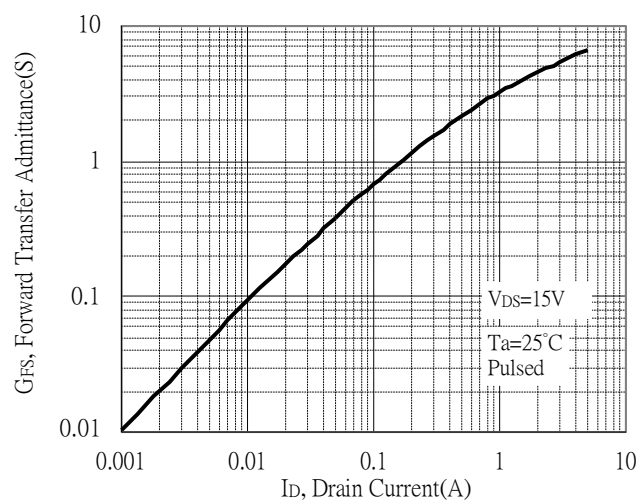
Capacitance vs Reverse Voltage



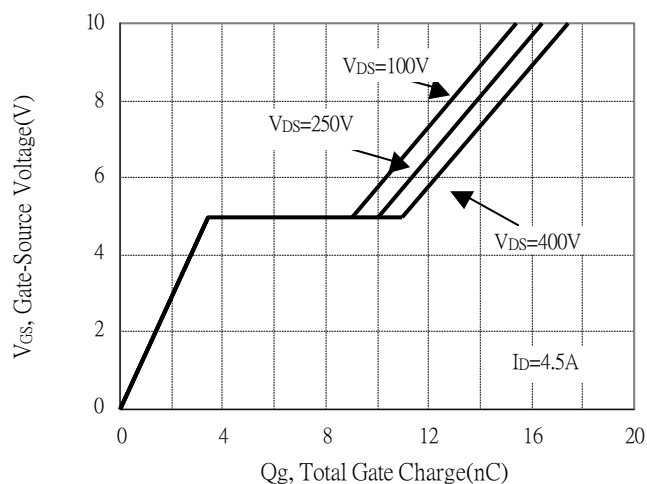
Threshold Voltage vs Junction Temperature



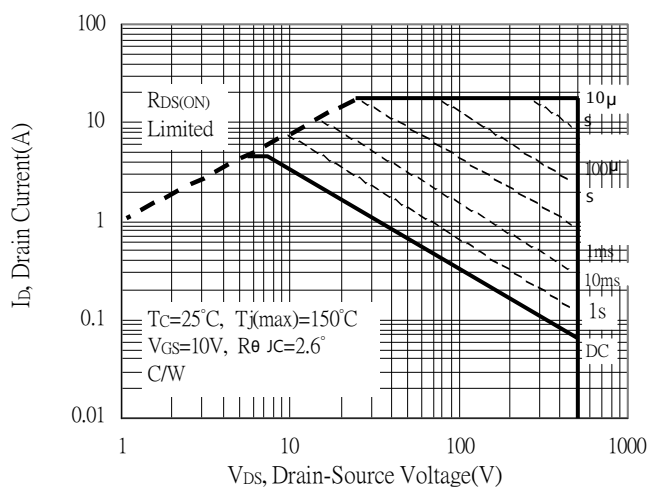
Forward Transfer Admittance vs Drain Current



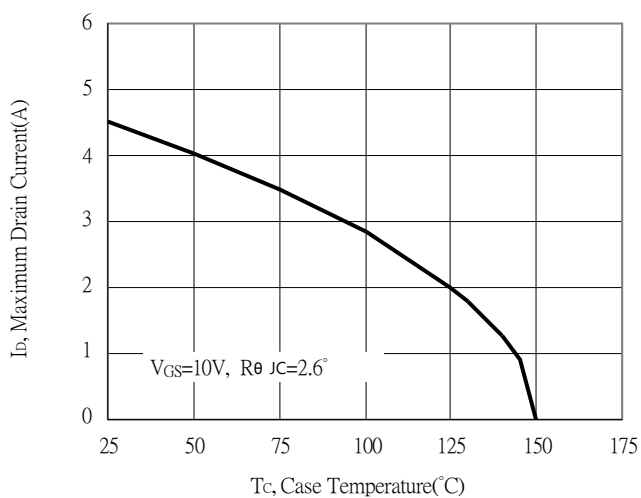
Gate Charge Characteristics



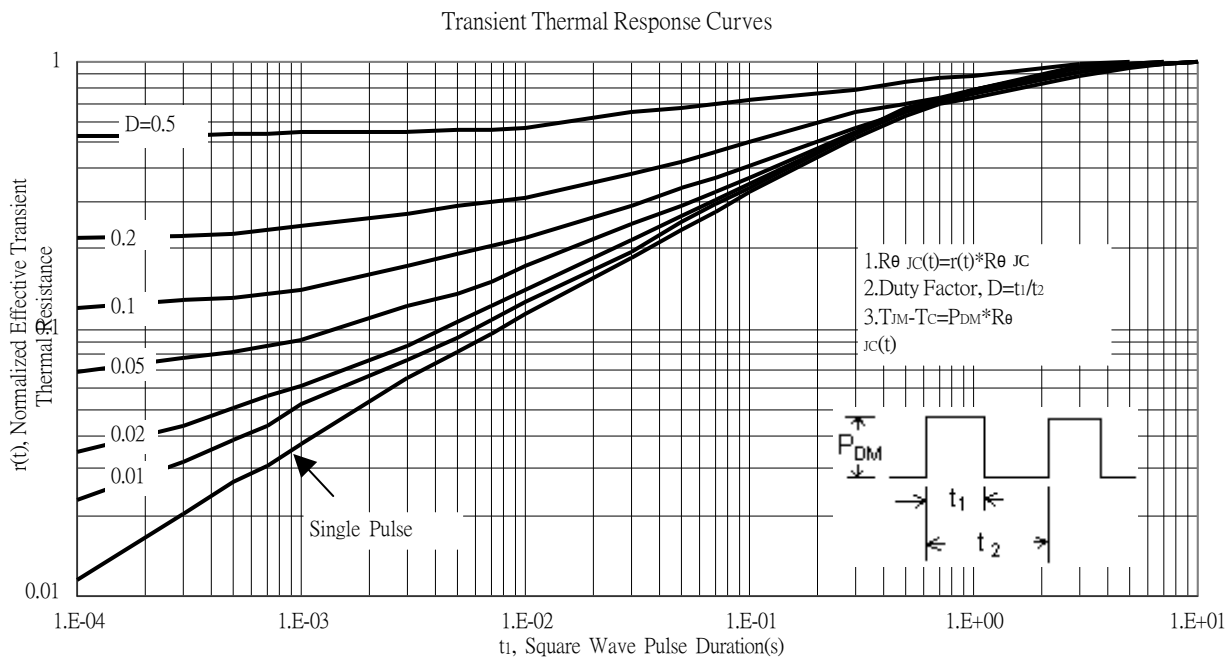
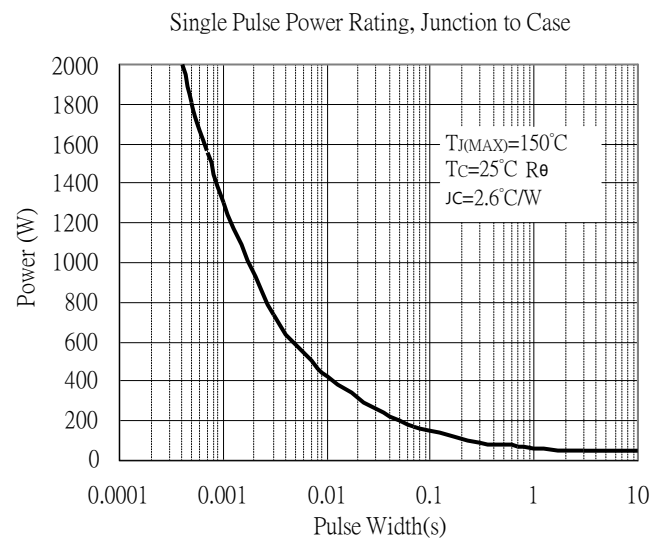
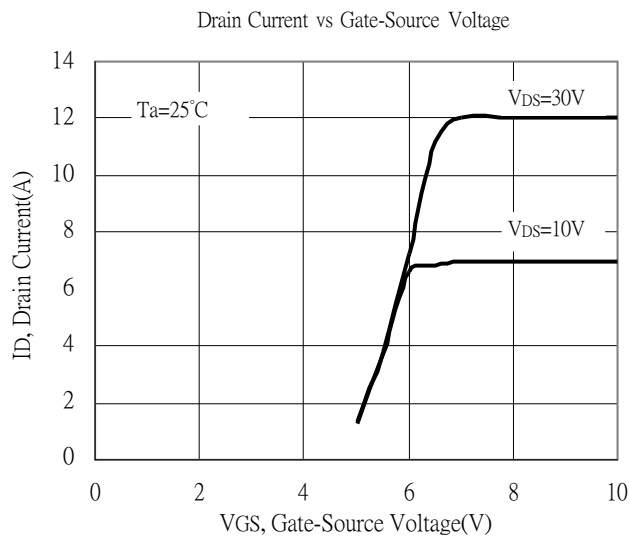
Maximum Safe Operating Area



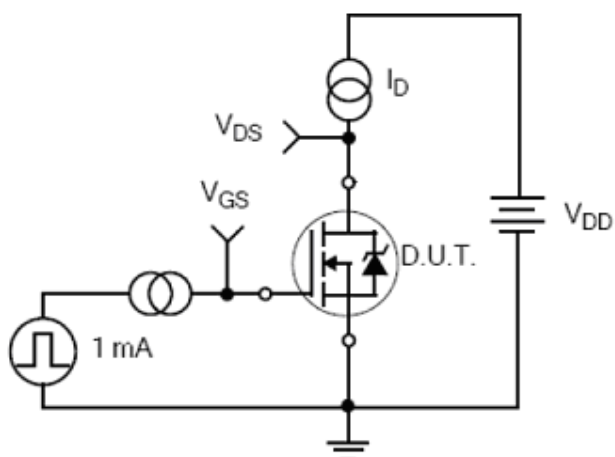
Maximum Drain Current vs Case Temperature



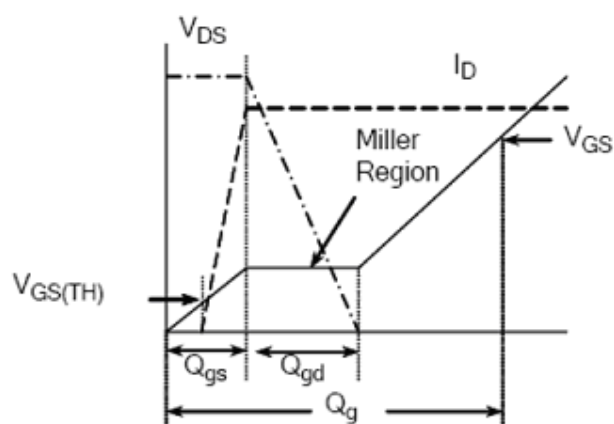
Typical Characteristics(Cont.)



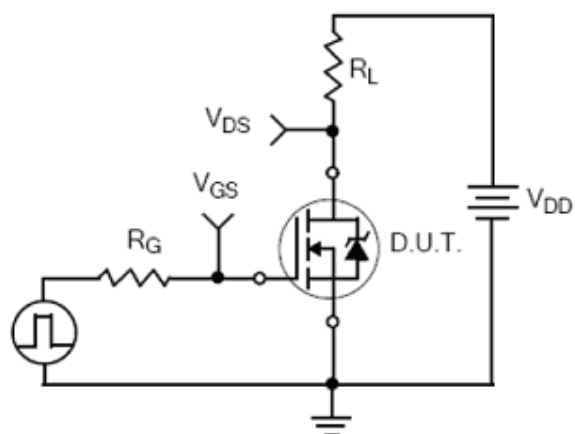
Test Circuit and Waveforms



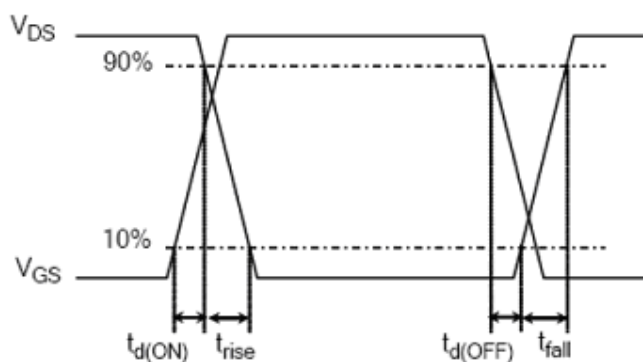
Gate Charge Test Circuit



Gate Charge Waveform

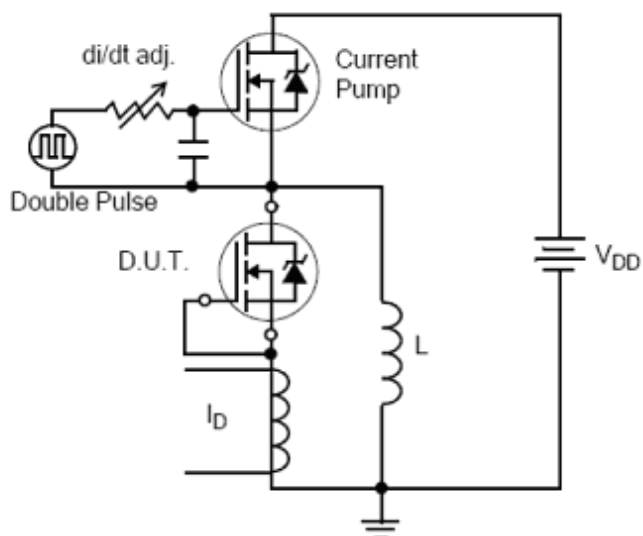


Resistive Switching Test Circuit

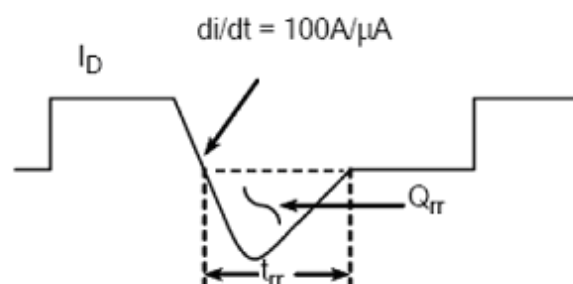


Resistive Switching Waveforms

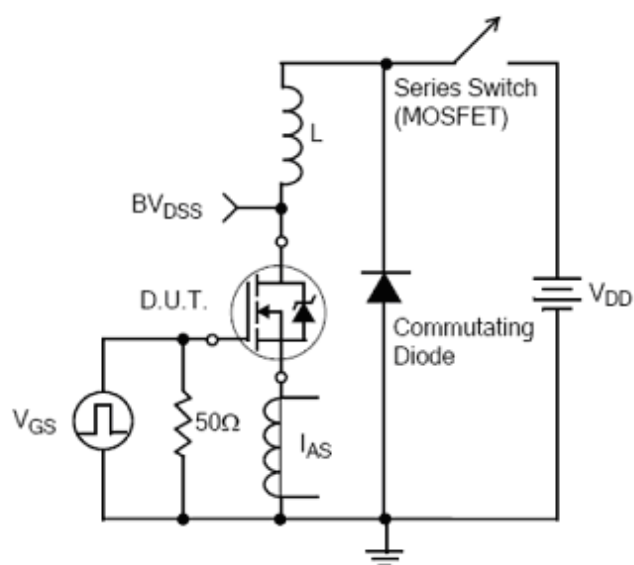
Test Circuit and Waveforms(Cont.)



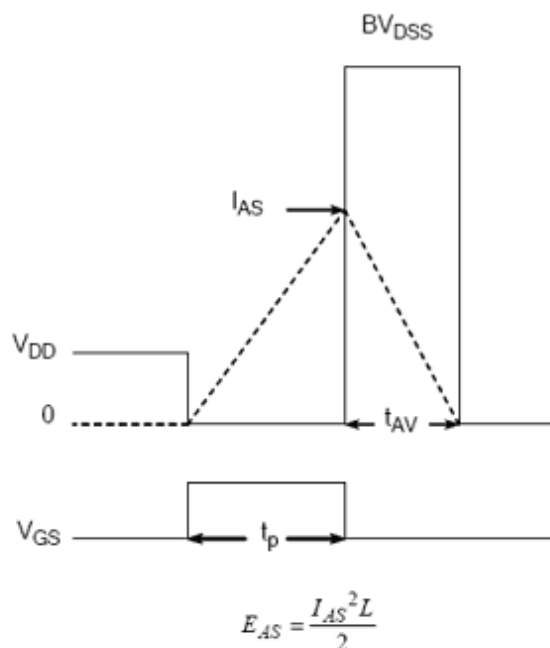
Diode Reverse Recovery Test Circuit



Diode Reverse Recovery Waveform

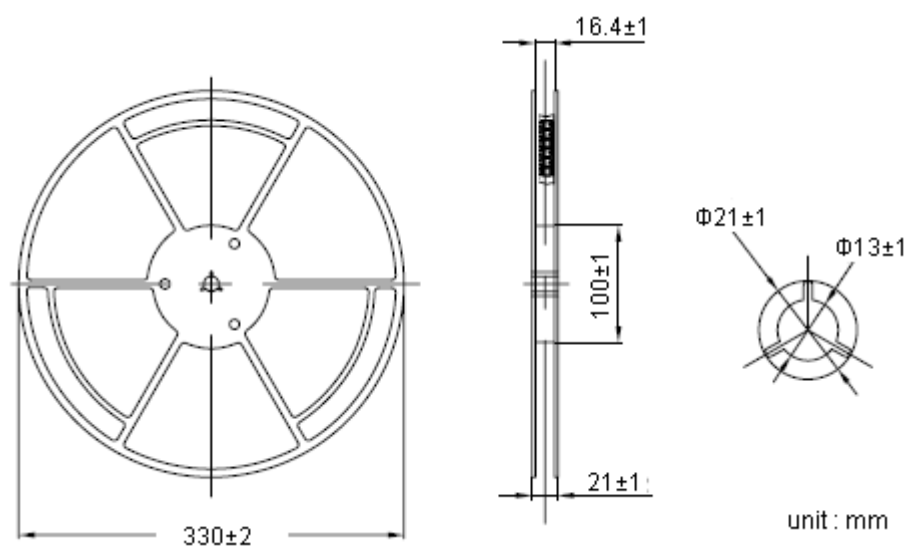


Unclamped Inductive Switching Test Circuit

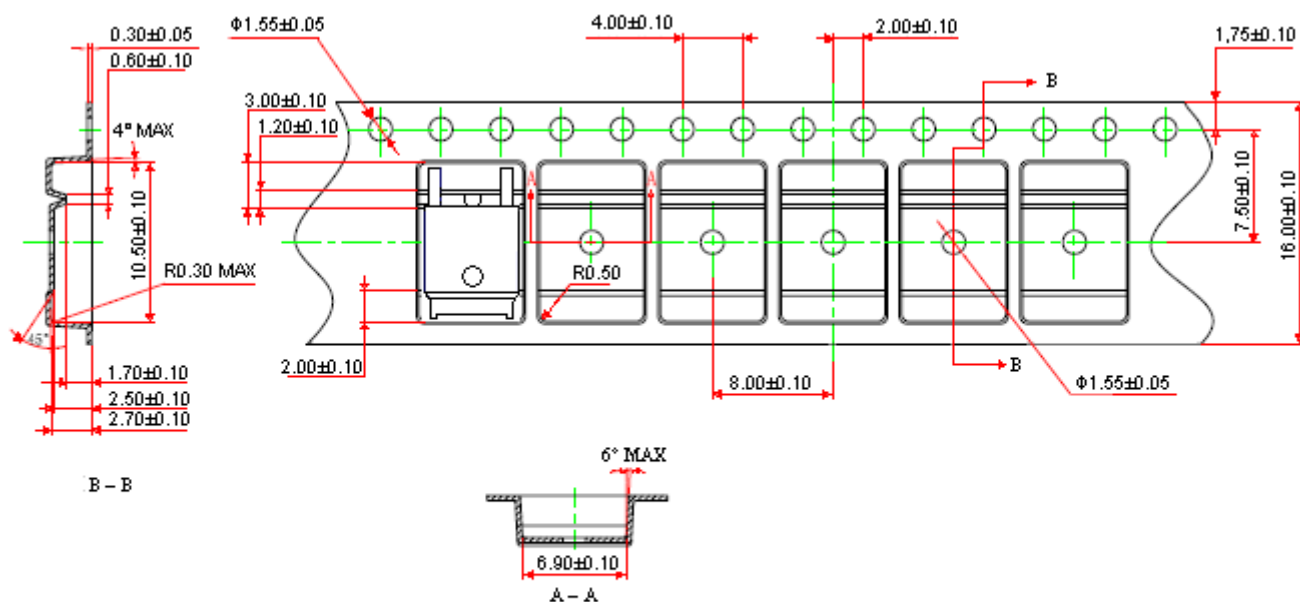


Unclamped Inductive Switching Waveforms

Reel Dimension



Carrier Tape Dimension

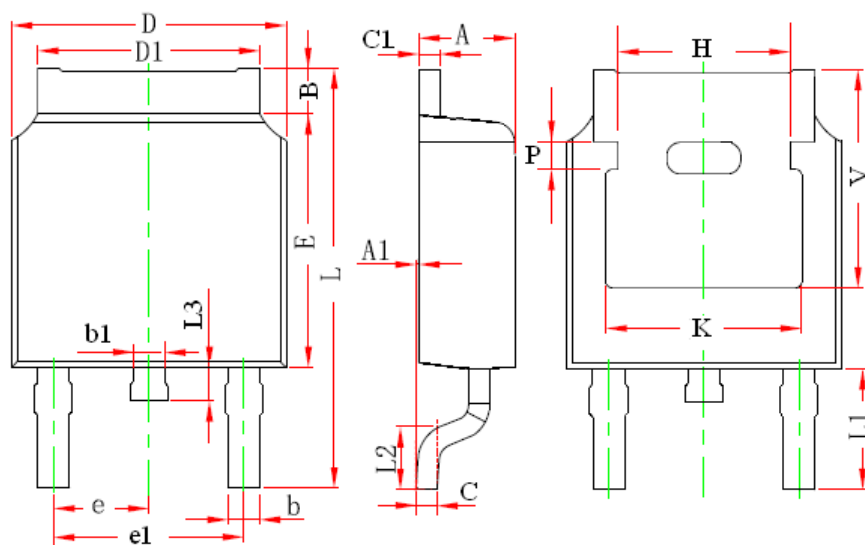


Notes:

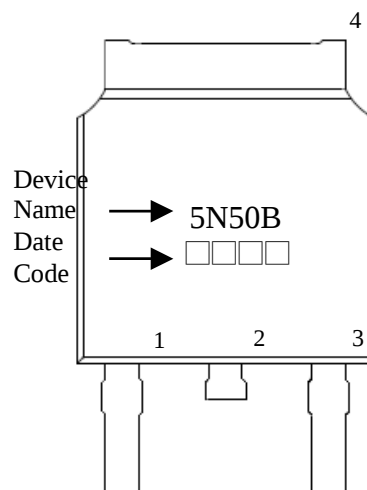
1. 10 sprocket hole pitch cumulative tolerance ± 0.2 .
2. Camber not to exceed 1mm in 100mm.
3. Material: conductive black polystyrene, antistatic coated : $10^5 \Omega/\square \sim 10^{11} \Omega/\square$

unit : mm

TO-252 Dimension



Marking:



3-Lead TO-252 Plastic Surface Mount Package
 Package Code: J3

Style: Pin 1.Gate 2.Drain 3.Source
 4.Drain

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.087	0.094	2.200	2.400	e	0.086	0.094	2.186	2.386
A1	0.000	0.005	0.000	0.127	e1	0.172	0.188	4.372	4.772
B	0.039	0.048	0.990	1.210	H	0.163	REF	4.140	REF
b	0.026	0.034	0.660	0.860	K	0.190	REF	4.830	REF
b1	0.026	0.034	0.660	0.860	L	0.386	0.409	9.800	10.400
C	0.018	0.023	0.460	0.580	L1	0.114	REF	2.900	REF
C1	0.018	0.023	0.460	0.580	L2	0.055	0.067	1.400	1.700
D	0.256	0.264	6.500	6.700	L3	0.024	0.039	0.600	1.000
D1	0.201	0.215	5.100	5.460	P	0.026	REF	0.650	REF
E	0.236	0.244	6.000	6.200	V	0.211	REF	5.350	REF