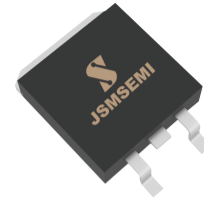


## FEATURES

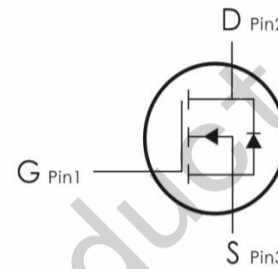
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

## APPLICATIONS

- DC-DC Converters
- DC-AC Inverters for UPS
- SMPS and Motor controls



TO-263-2L



Device Marking and Package Information		
Device	Package	Marking
FDB33N25TM	TO-263-2L	FDB33N25

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ , unless otherwise noted			
Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	250	V
Continuous Drain Current	$I_D$	35	A
Pulsed Drain Current (note1)	$I_{DM}$	160	A
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Single Pulse Avalanche Energy (note1)	$E_{AS}$	191	mJ
Avalanche Current (note1)	$I_{AS}$	31	A
Repetitive Avalanche Energy (note1)	$E_{AR}$	124	mJ
Power Dissipation ( $T_C = 25^\circ\text{C}$ )	$P_D$	250	W
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55~+150	$^\circ\text{C}$

Thermal Resistance			
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{thJC}$	1.2	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient	$R_{thJA}$	60	

Specifications $T_J = 25^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	250	--	--	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 250V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	1	$\mu A$
		$V_{DS} = 250V, V_{GS} = 0V, T_J = 125^\circ\text{C}$	--	--	100	
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	--	--	$\pm 100$	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	--	4.0	V
Drain-Source On-Resistance (Note4)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 20A$	--	0.05	0.06	$\Omega$
Forward Transconductance (Note4)	gfs	$V_{DS} = 25V, I_D = 20A$	--	16	--	S
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0V, V_{DS} = 25V, f = 1.0\text{MHz}$	--	2800	--	$\mu F$
Output Capacitance	$C_{oss}$		--	355	--	
Reverse Transfer Capacitance	$C_{rss}$		--	101	--	
Total Gate Charge	$Q_g$	$V_{DD} = 160V, I_D = 40A,$	--	154	--	nC
Gate-Source Charge	$Q_{gs}$		--	13	--	
Gate-Drain Charge	$Q_{gd}$		--	58	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 160V, I_D = 40A, V_{GS} = 15V, R_G = 25\Omega$	--	46	--	ns
Turn-on Rise Time	$t_r$		--	54	--	
Turn-off Delay Time	$t_{d(off)}$		--	360	--	
Turn-off Fall Time	$t_f$		--	96	--	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source Current	$I_{SD}$	Integral PN-diode in MOSFET	--	--	35	A
Pulsed Source Current	$I_{SM}$		--	--	160	
Body Forward Voltage	$V_{SD}$	$I_S = 20A, V_{GS} = 0V$	--	--	1.4	V
Reverse Recovery Time	$t_{rr}$	$V_{GS} = 0V, I_F = 10A, di_F/dt = 100A/\mu s$	--	152	--	ns
Reverse Recovery Charge	$Q_{rr}$		--	1	--	$\mu C$

**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2.  $L = 1\text{mH}, V_{DD} = 30V, R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$
3. Pulse Test: Pulse width  $\leq 300\mu s$ , Duty Cycle  $\leq 1\%$

Typical Characteristics  $T_J = 25^\circ\text{C}$ , unless otherwise noted

Figure 1. Output Characteristics ( $T_J = 25^\circ\text{C}$ )

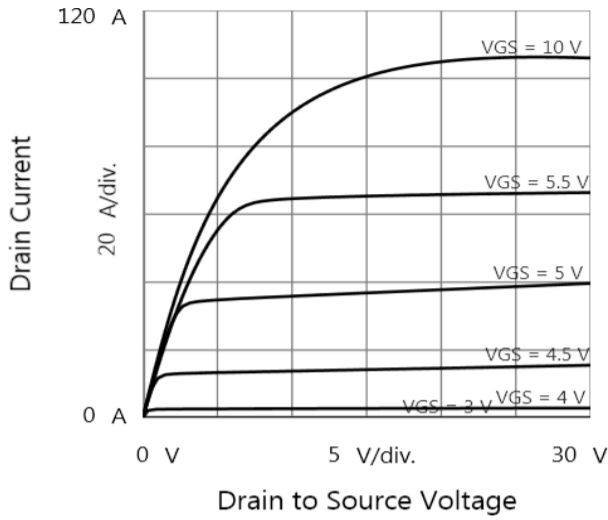


Figure 2. Transfer Characteristics

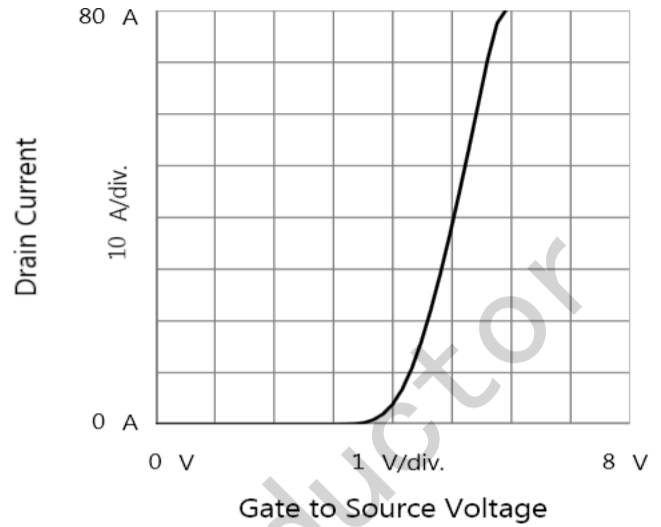


Figure 3. Drain to Source Resistance vs. Drain Current

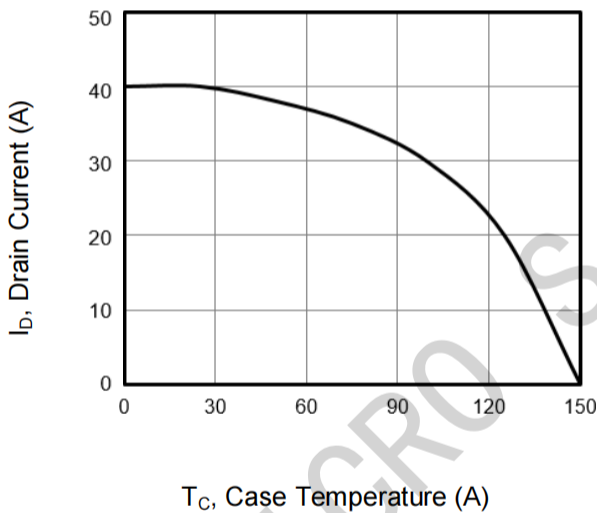


Figure 4.  $BV_{DSS}$  Variation vs. Temperature

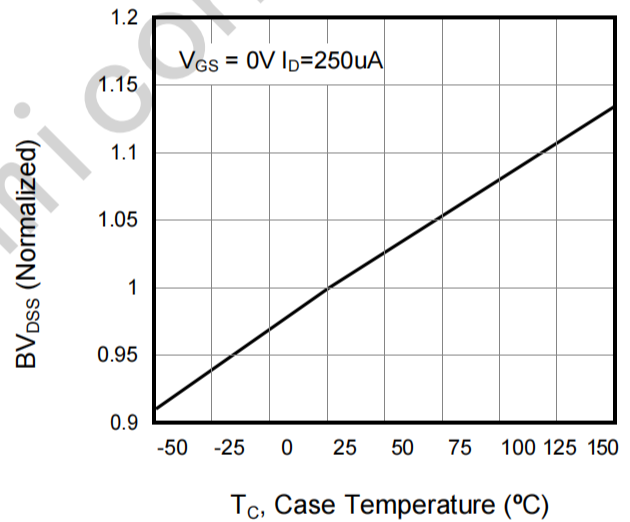


Figure 5. Drain to Source Voltage vs. Gate to Source Voltage

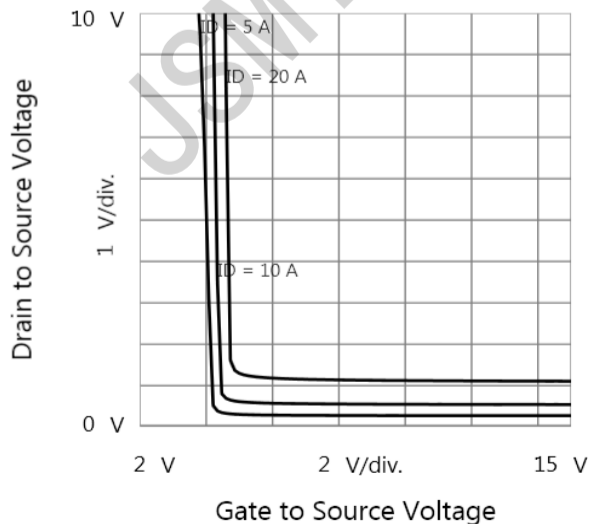
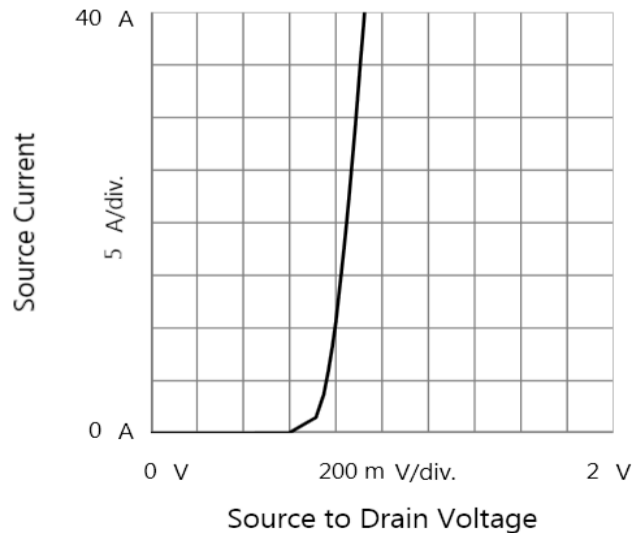


Figure 6. Body Diode Forward Characteristics



Typical Characteristics  $T_J = 25^\circ\text{C}$ , unless otherwise noted

Figure 7. Capacitance

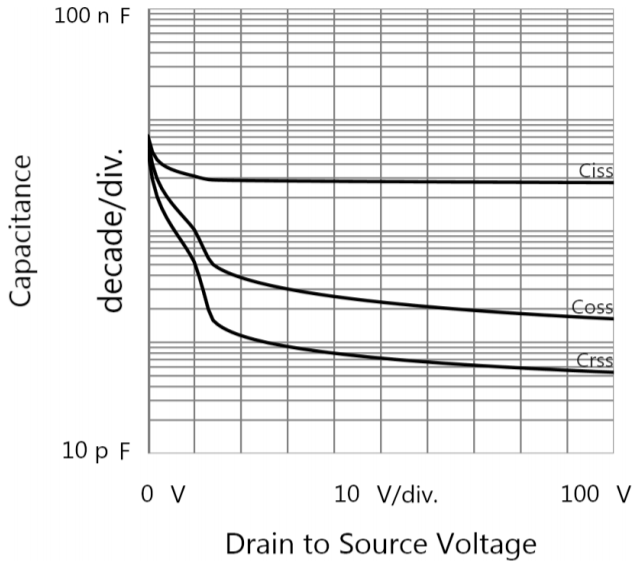


Figure 8. Gate Charge

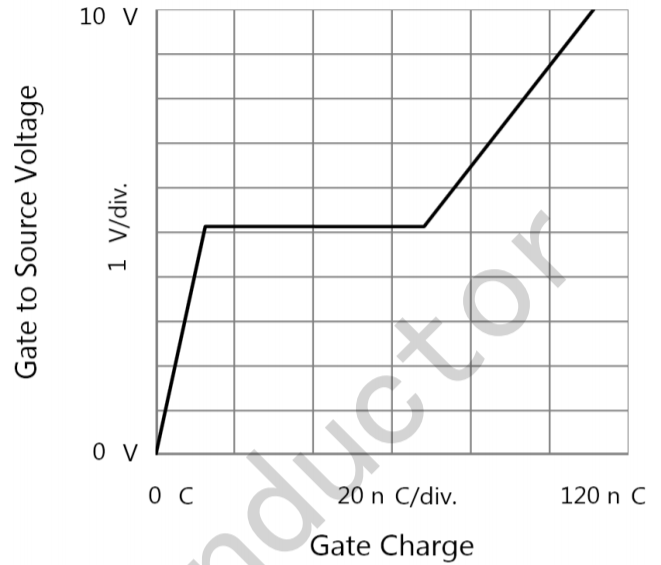
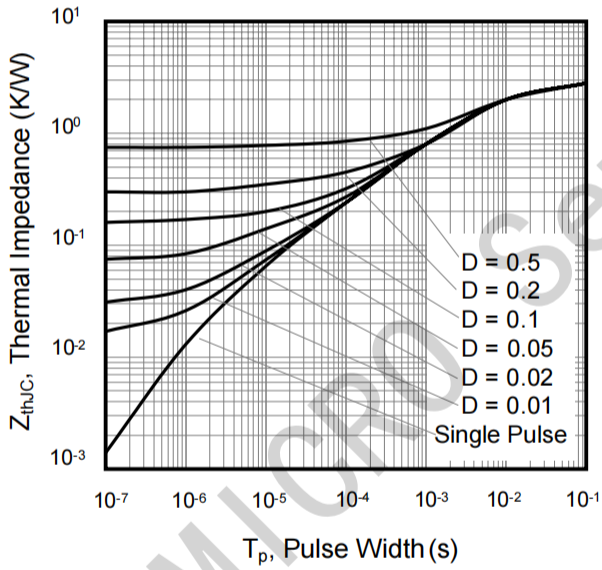
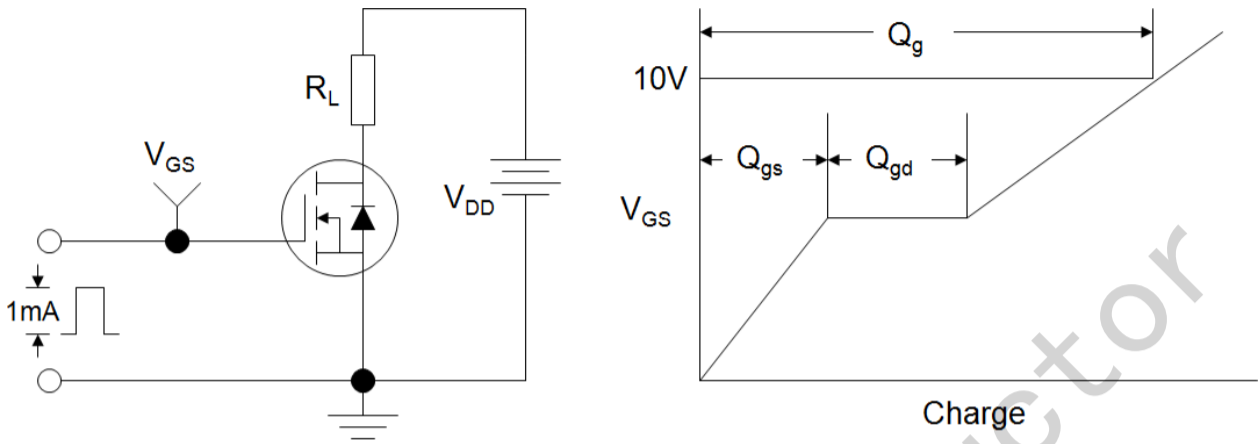


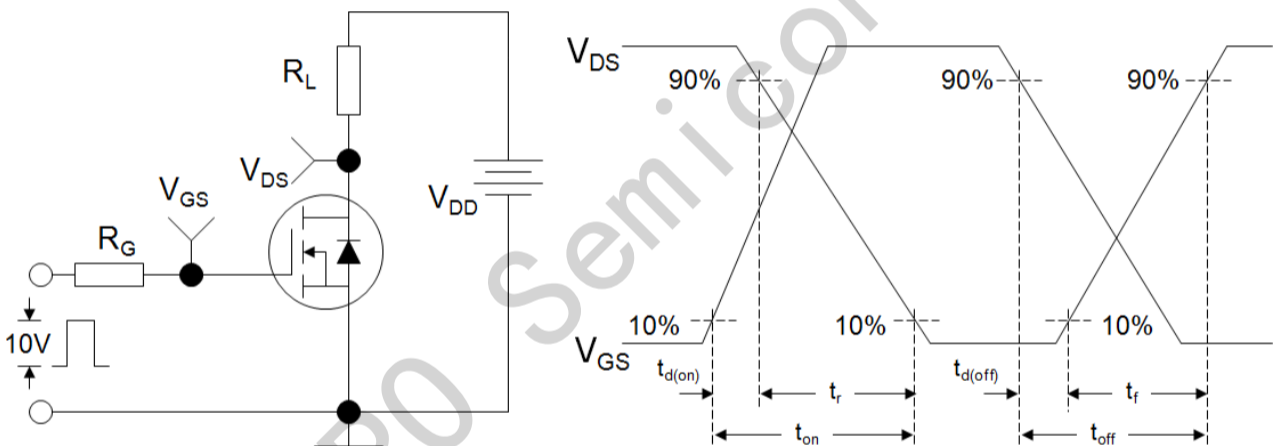
Figure 9. Transient Thermal Impedance



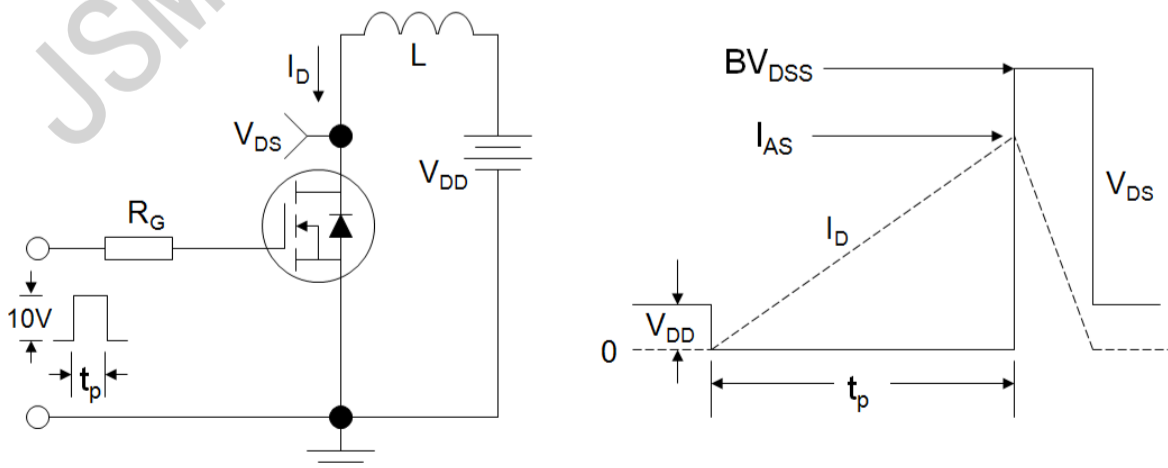
**Figure A: Gate Charge Test Circuit and Waveform**



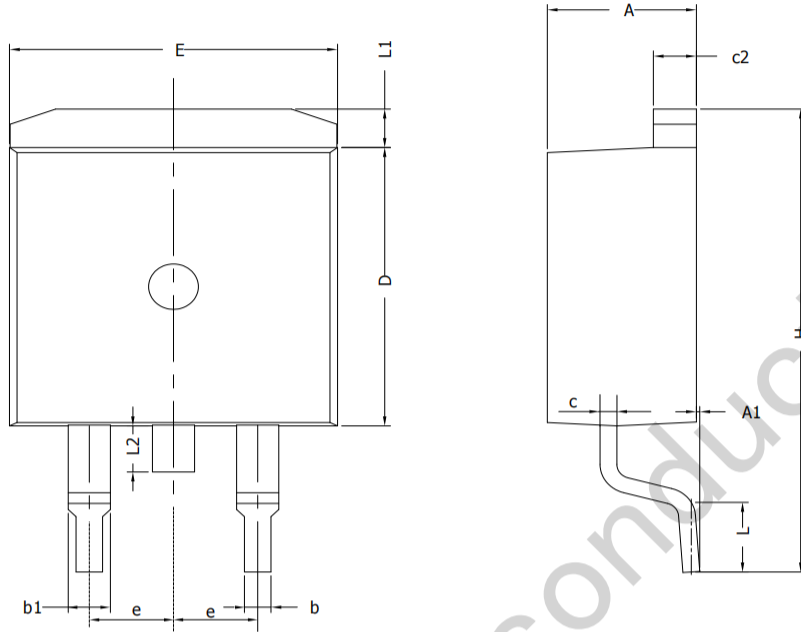
**Figure B: Resistive Switching Test Circuit and Waveform**



**Figure C: Unclamped Inductive Switching Test Circuit and Waveform**



Package Outline: TO-263



SYMBOL	MIN	NOM	MAX
A	4.30	4.57	4.72
A1	0	0.10	0.25
b	0.71	0.81	0.91
c	0.30	---	0.60
c2	1.17	1.27	1.37
D	8.50	---	9.35
E	9.80	---	10.45
e	2.54BSC		
H	14.70	---	15.75
L	2.00	2.30	2.74
L1	1.12	1.27	1.42
L2	---	---	1.75