

DTU5N80SJ-VB Datasheet

N-Channel 800V (D-S)Super Junction Power MOSFET

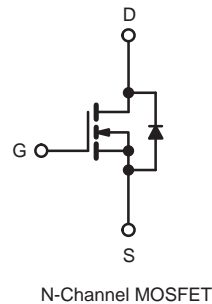
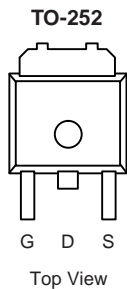
PRODUCT SUMMARY		
V_{DS} (V)	800	
$R_{DS(on)}$ (Ω)	$V_{GS} = 10\text{ V}$	1.2
Q_g (Max.) (nC)	200	
Q_{gs} (nC)	24	
Q_{gd} (nC)	110	
Configuration	Single	

FEATURES

- Dynamic dV/dt Rating
- Repetitive Avalanche Rated
- Isolated Central Mounting Hole
- Fast Switching
- Ease of Paralleling
- Simple Drive Requirements
- Compliant to RoHS Directive 2002/95/EC



RoHS*
COMPLIANT



ABSOLUTE MAXIMUM RATINGS ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	800	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current	V_{GS} at 10 V	I_D	5	A
			3.9	
Pulsed Drain Current ^a		I_{DM}	21	
Linear Derating Factor			1.5	W/ $^\circ\text{C}$
Single Pulse Avalanche Energy ^b		E_{AS}	770	mJ
Repetitive Avalanche Current ^a		I_{AR}	7.8	A
Repetitive Avalanche Energy ^a		E_{AR}	19	mJ
Maximum Power Dissipation	$T_C = 25\text{ }^\circ\text{C}$	P_D	190	W
Peak Diode Recovery dV/dt ^c		dV/dt	2.0	V/ns
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to + 150	$^\circ\text{C}$
Soldering Recommendations (Peak Temperature)	for 10 s		300 ^d	
Mounting Torque	6-32 or M3 screw		10	lbf · in
			1.1	N · m

Notes

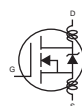

- a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
 b. $V_{DD} = 50\text{ V}$, starting $T_J = 25\text{ }^\circ\text{C}$, $L = 23\text{ mH}$, $R_g = 25\text{ }\Omega$, $I_{AS} = 7.8\text{ A}$ (see fig. 12).
 c. $I_{SD} \leq 7.8\text{ A}$, $dI/dt \leq 140\text{ A}/\mu\text{s}$, $V_{DD} \leq 600\text{ V}$, $T_J \leq 150\text{ }^\circ\text{C}$.
 d. 1.6 mm from case.

* Pb containing terminations are not RoHS compliant, exemptions may apply

THERMAL RESISTANCE RATINGS

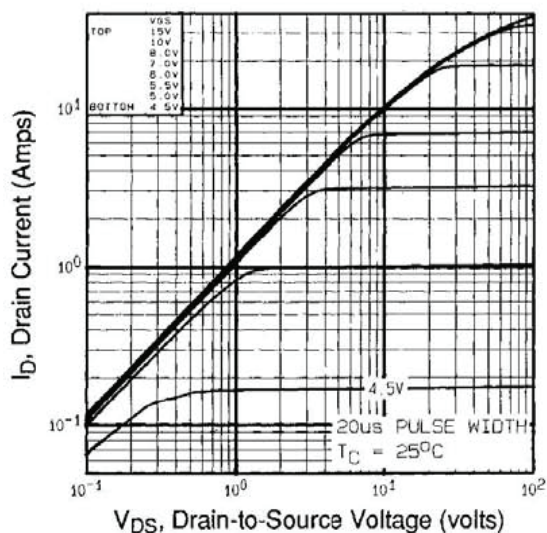
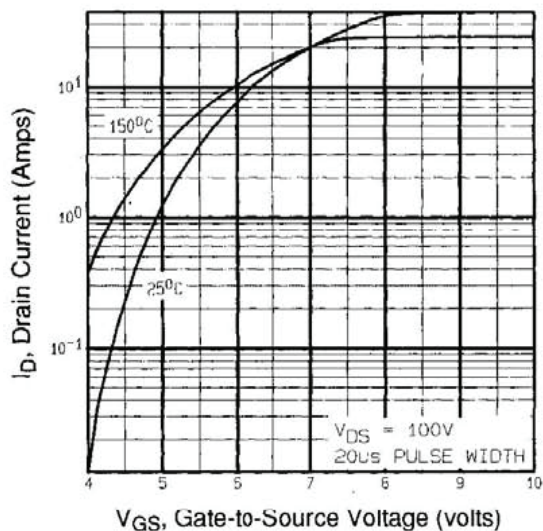
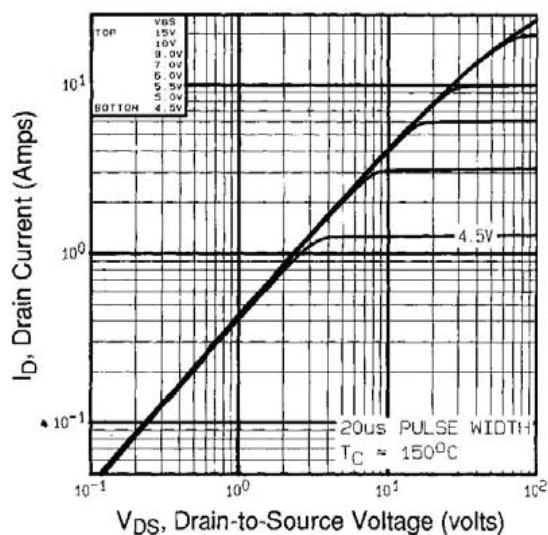
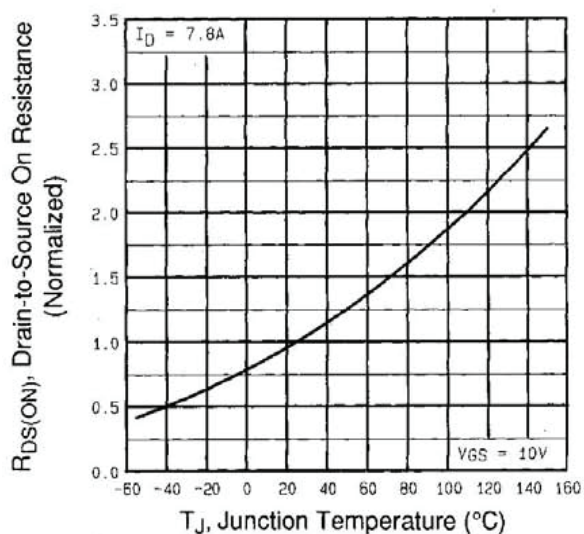
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	R_{thJA}	-	40	°C/W
Case-to-Sink, Flat, Greased Surface	R_{thCS}	0.24	-	
Maximum Junction-to-Case (Drain)	R_{thJC}	-	0.65	

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

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA		800	-	-	V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	Reference to 25 °C, I _D = 1 mA		-	0.98	-	V/°C
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		2.0	-	4.0	V
Gate-Source Leakage	I _{GSS}	V _{GS} = ± 20 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 800 V, V _{GS} = 0 V		-	-	100	μA
		V _{DS} = 640 V, V _{GS} = 0 V, T _J = 125 °C		-	-	500	
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} = 10 V	I _D = 3.7 A ^b	-	1.2	-	Ω
Forward Transconductance	g _{fs}	V _{DS} = 100 V, I _D = 3.7 A ^b		5.6	-	-	S
Dynamic							
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1.0 MHz, see fig. 5		-	3100	-	pF
Output Capacitance	C _{oss}			-	800	-	
Reverse Transfer Capacitance	C _{rss}			-	490	-	
Total Gate Charge	Q _g	V _{GS} = 10 V	I _D = 3.8 A, V _{DS} = 400 V, see fig. 6 and 13 ^b	-	-	200	nC
Gate-Source Charge	Q _{gs}			-	-	24	
Gate-Drain Charge	Q _{gd}			-	-	110	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 400 V, I _D = 3.8 A, R _g = 6.2 Ω, R _D = 52 Ω see fig. 10 ^b		-	19	-	ns
Rise Time	t _r			-	38	-	
Turn-Off Delay Time	t _{d(off)}			-	120	-	
Fall Time	t _f			-	39	-	
Internal Drain Inductance	L _D	Between lead, 6 mm (0.25") from package and center of die contact 		-	5.0	-	nH
Internal Source Inductance	L _S			-	13	-	
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I _S	MOSFET symbol showing the integral reverse p - n junction diode 		-	-	5.0	A
Pulsed Diode Forward Current ^a	I _{SM}			-	-	21	
Body Diode Voltage	V _{SD}	T _J = 25 °C, I _S = 3.8 A, V _{GS} = 0 V ^b		-	-	1.8	V
Body Diode Reverse Recovery Time	t _{rr}	T _J = 25 °C, I _F = 3.8 A, di/dt = 100 A/μs ^b		-	650	980	ns
Body Diode Reverse Recovery Charge	Q _{rr}			-	3.8	5.7	μC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L _S and L _D)					

Notes

- a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
 b. Pulse width $\leq 300\text{ }\mu\text{s}$; duty cycle $\leq 2\%$.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Fig. 1 - Typical Output Characteristics, $T_C = 25\text{ }^{\circ}\text{C}$

Fig. 3 - Typical Transfer Characteristics

Fig. 2 - Typical Output Characteristics, $T_C = 150\text{ }^{\circ}\text{C}$

Fig. 4 - Normalized On-Resistance vs. Temperature

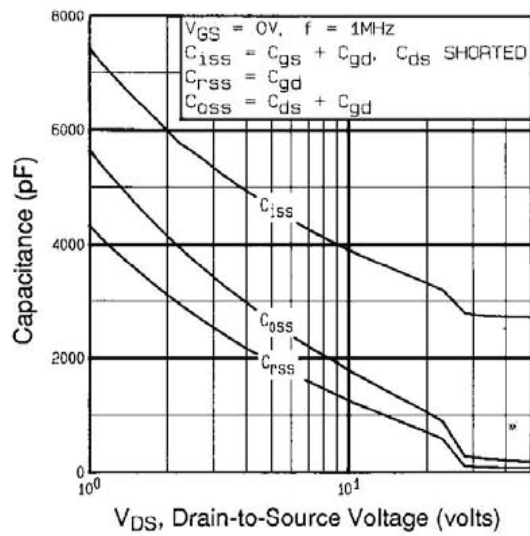


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

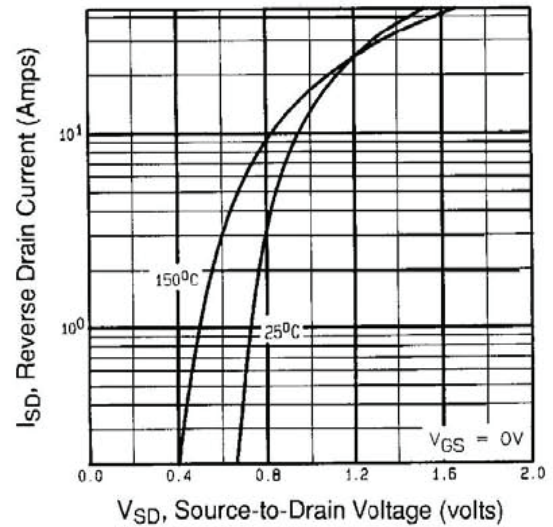


Fig. 7 - Typical Source-Drain Diode Forward Voltage

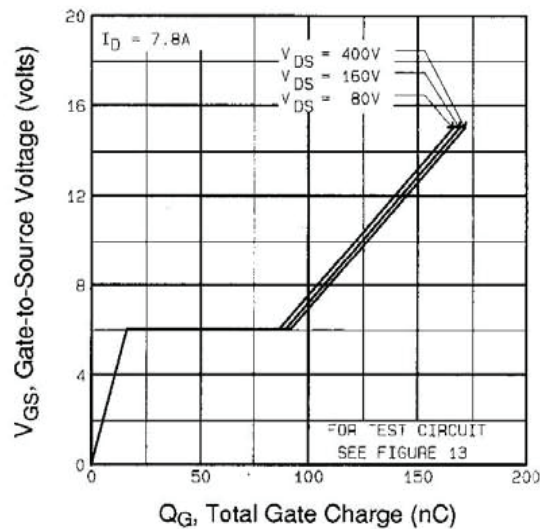


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

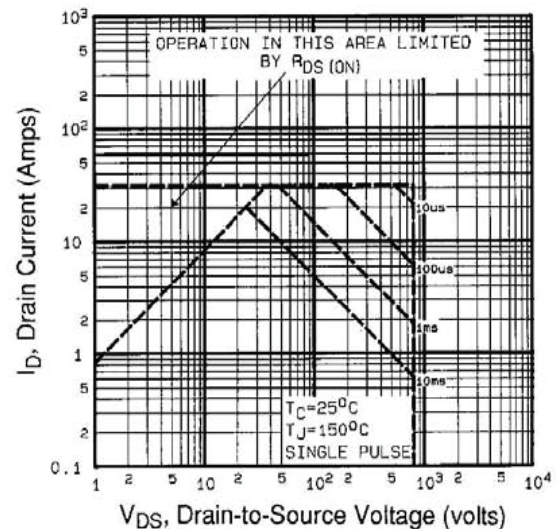


Fig. 8 - Maximum Safe Operating Area

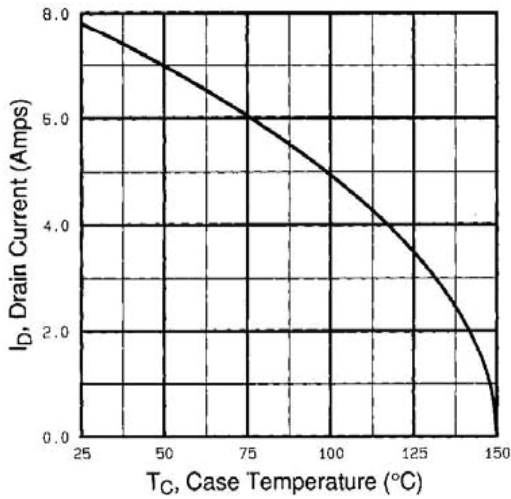


Fig. 9 - Maximum Drain Current vs. Case Temperature

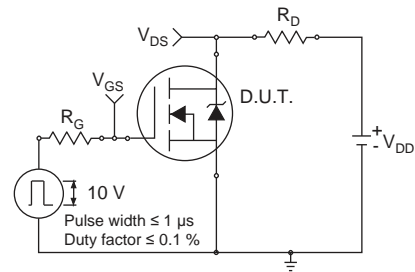


Fig. 10a - Switching Time Test Circuit

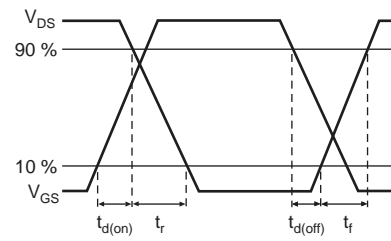


Fig. 10b - Switching Time Waveforms

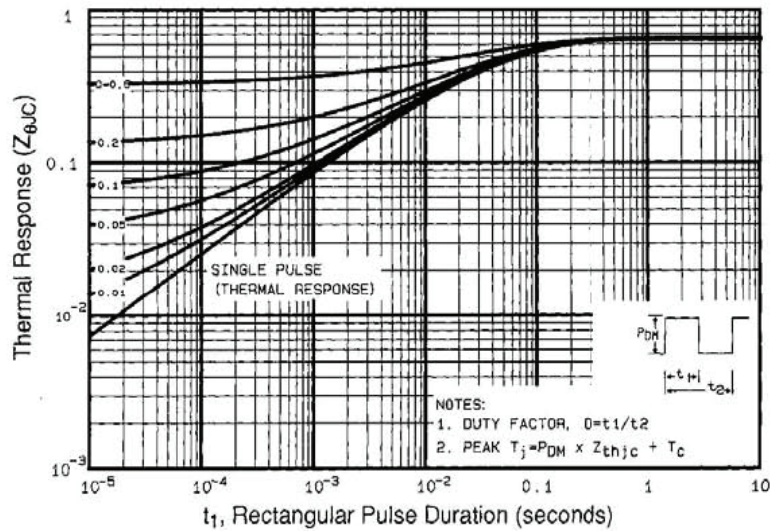


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

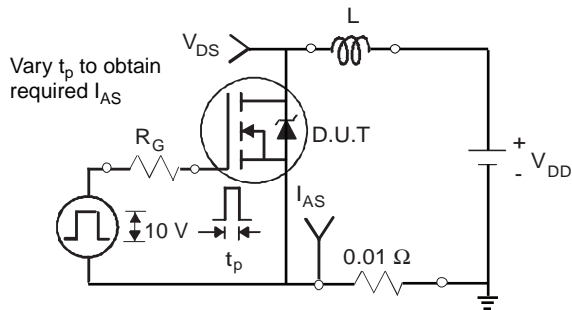


Fig. 12a - Unclamped Inductive Test Circuit

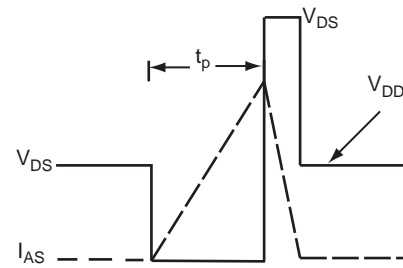


Fig. 12b - Unclamped Inductive Waveforms

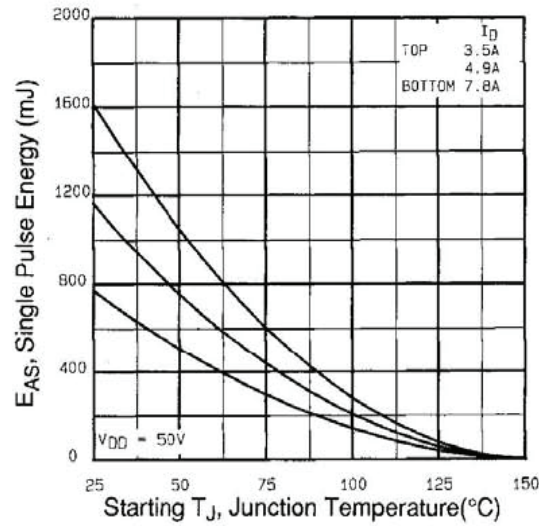


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

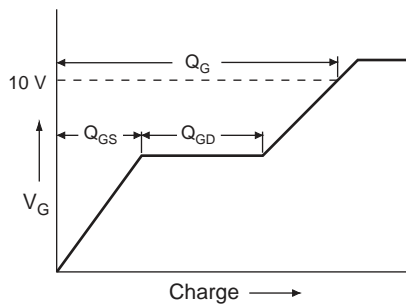


Fig. 13a - Basic Gate Charge Waveform

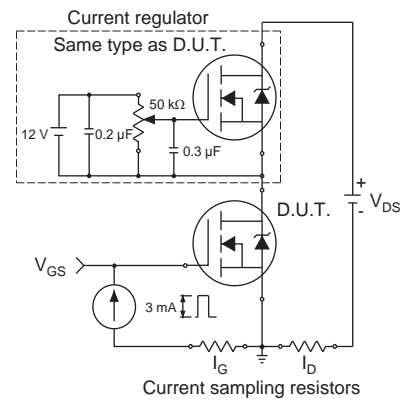


Fig. 13b - Gate Charge Test Circuit

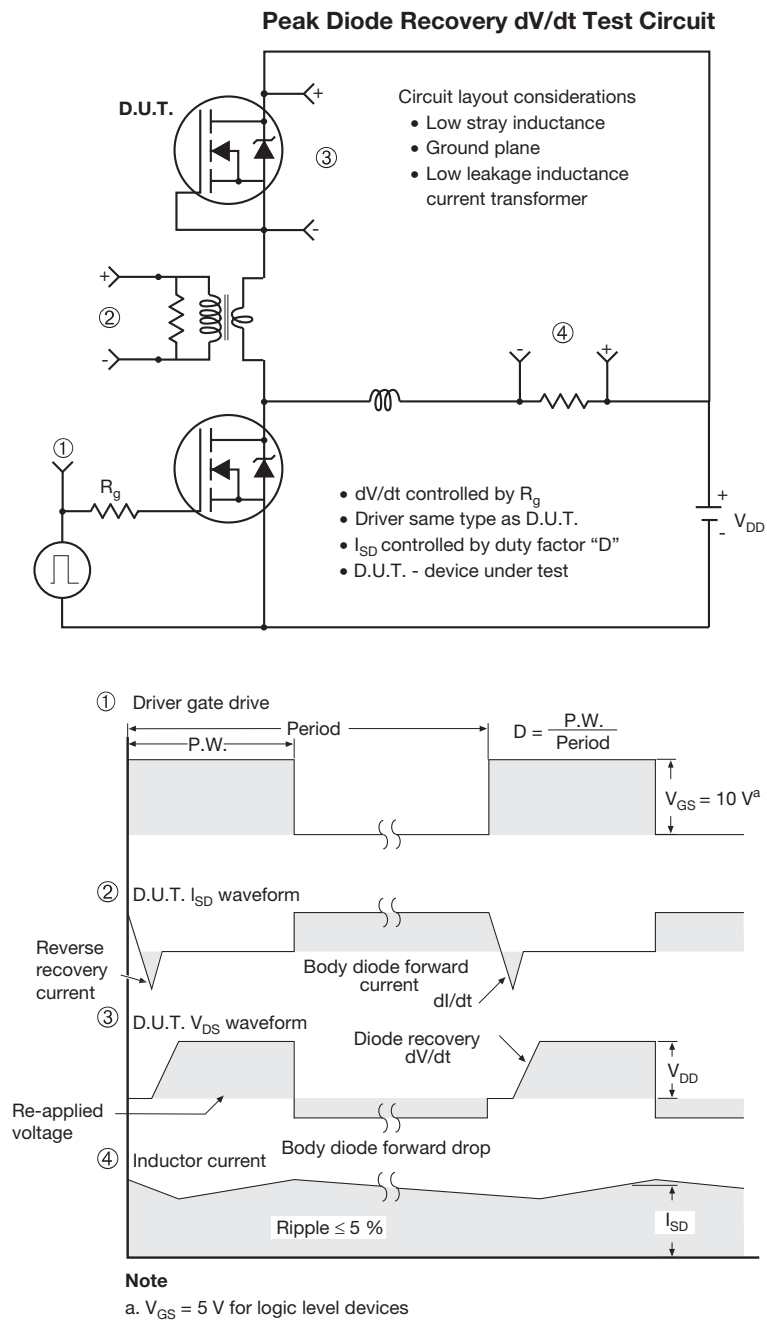


Fig. 14 - For N-Channel

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