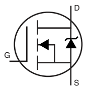
THERMAL RESISTANCE RATINGS

PARAMETER		SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	TO-220AB	R_{thJA}	-	62	°C/W
Maximum Junction-to-Case (Drain)	TO-220AB	R_{thJC}	-	0.5	

SPECIFICATIONS (T_J = 25 °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 = 1 mA	600	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to 25 °C, I_D = 1 mA	-	0.70	-	V/°C
Gate-Source Threshold Voltage (N)	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	2.0	-	4.0	V
Gate-Source Leakage	I_{GSS}	V_{GS} = ± 20 V	-	-	± 100	nA
		V_{GS} = ± 30 V	-	-	± 1	µA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 600 V, V_{GS} = 0 V	-	-	1	µA
		V_{DS} = 600 V, V_{GS} = 0 V, T_J = 150 °C	-	-	100	
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS} = 10 V I_D = 11 A	-	0.160	0.190	Ω
Forward Transconductance [a]	g_{fs}	V_{DS} = 50 V, I_D = 13 A	-	9.4	-	S
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1.0 MHz	562	2810	5620	pF
Output Capacitance	C_{oss}		296	1480	2960	
Reverse Transfer Capacitance	C_{rss}		6.6	33	66	
Effective Output Capacitance (Time Related)	$C_{oss\ eff.}$ (TR)[a]	V_{GS} = 0 V V_{DS} = 0 V to 480 V	-	155	-	
Total Gate Charge	Q_g	V_{GS} = 10 V I_D = 22 A, V_{DS} = 480 V	-	75	110	nC
Gate-Source Charge	Q_{gs}		-	17	-	
Gate-Drain Charge	Q_{gd}		-	25	-	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 380 V, I_D = 22 A, R_g = 9.1 Ω, V_{GS} = 10 V	-	24	50	ns
Rise Time	t_r		-	68	100	
Turn-Off Delay Time	$t_{d(off)}$		-	77	115	
Fall Time	t_f		-	59	90	
Gate Input Resistance	R_g	f = 1 MHz, open drain	0.13	0.65	1.3	Ω
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	22	A
Pulsed Diode Forward Current	I_{SM}		-	-	88	
Diode Forward Voltage	V_{SD}	T_J = 25 °C, I_S = 22 A, V_{GS} = 0 V	-	-	1.2	V
Reverse Recovery Time	t_{rr}	T_J = 25 °C, I_F = I_S, dI/dt = 100 A/µs, V_R = 25 V	-	462	690	ns
Reverse Recovery Charge	Q_{rr}		-	8.3	16	µC
Reverse Recovery Current	I_{RRM}		-	30	60	A

Note

a. $C_{oss\ eff.}$ (TR) is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 % to 80 % V_{DS}.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

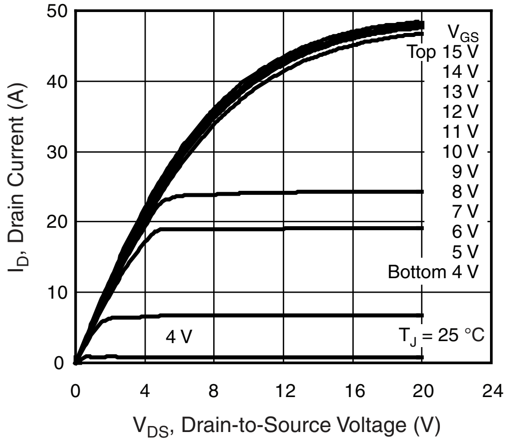


Fig. 1 - Typical Output Characteristics, T_J = 25 °C

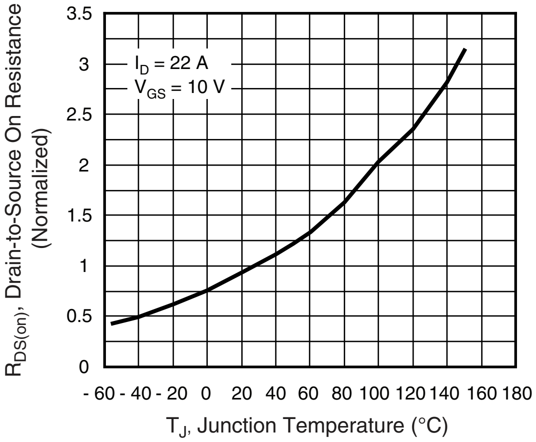


Fig. 4 - Normalized On-Resistance vs. Temperature

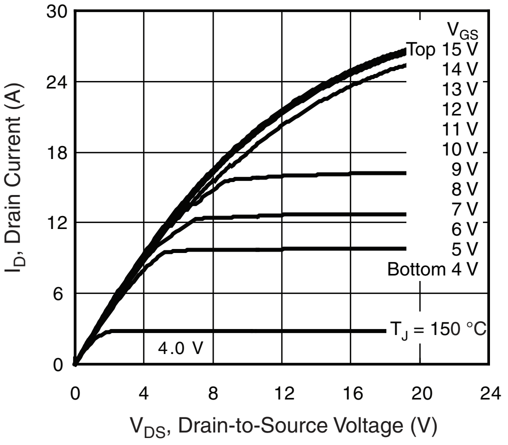


Fig. 2 - Typical Output Characteristics, T_J = 150 °C

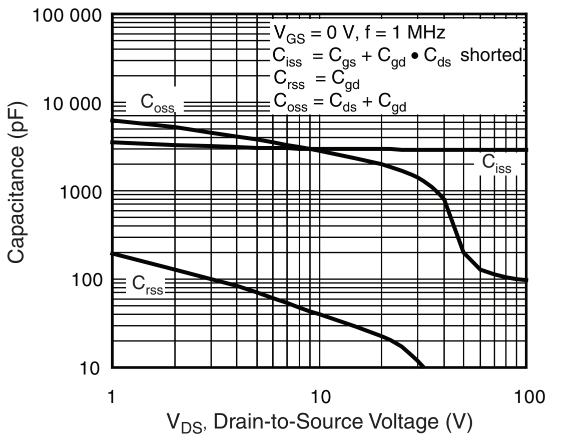


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

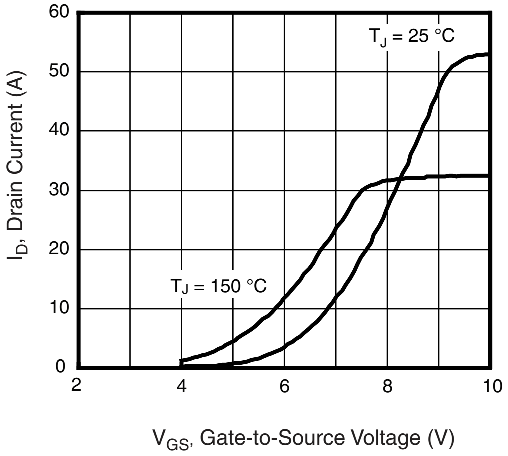


Fig. 3 - Typical Transfer Characteristics

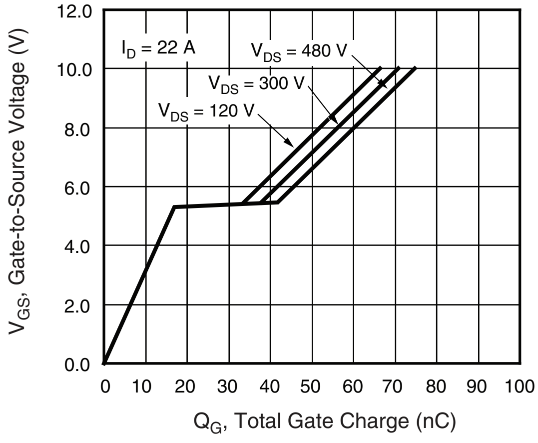


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

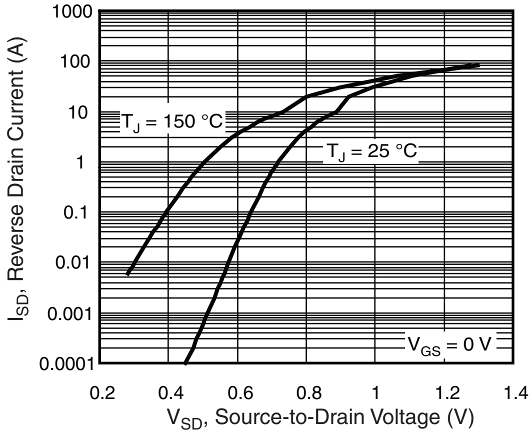


Fig. 7 - Typical Source-Drain Diode Forward Voltage

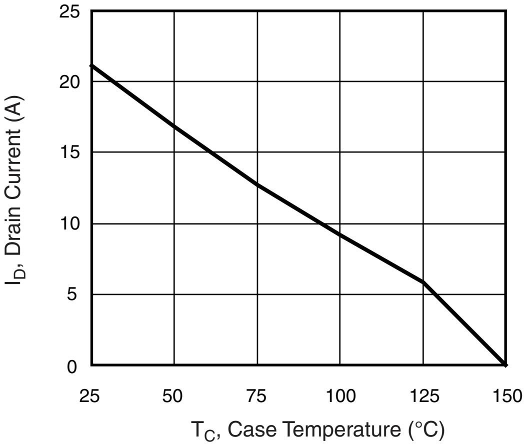


Fig. 9 - Maximum Drain Current vs. Case Temperature

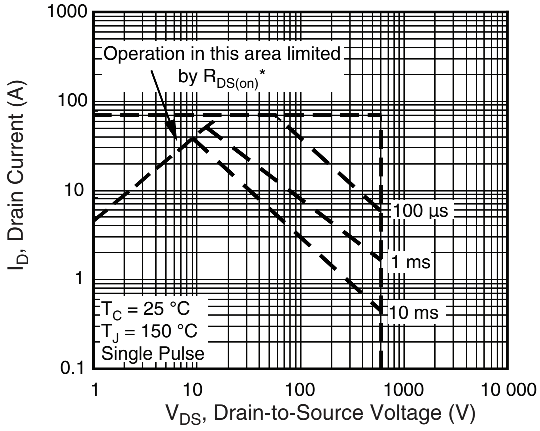


Fig. 8 - Maximum Safe Operating Area

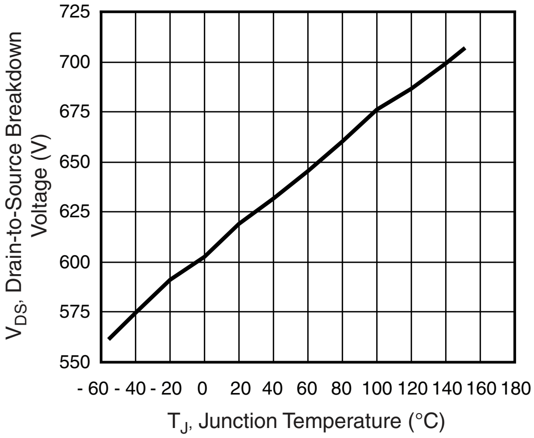


Fig. 10 - Drain-to-Source Breakdown Voltage

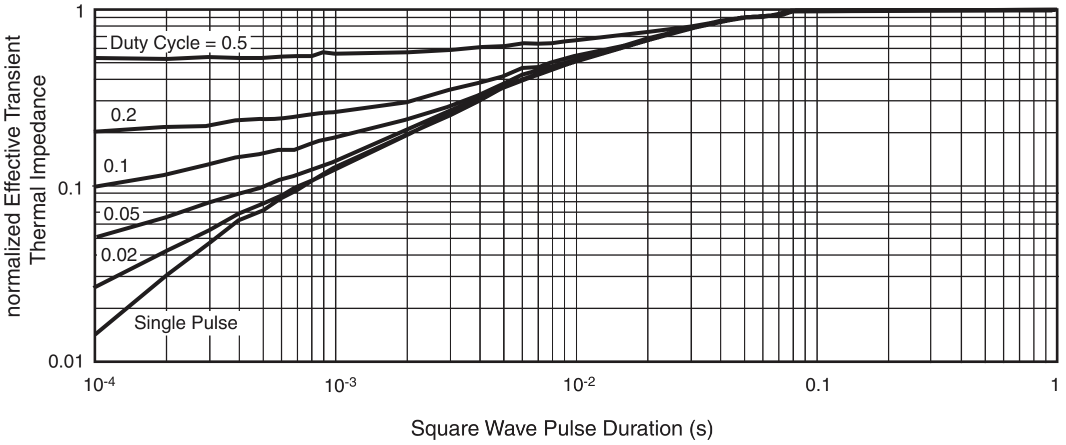


Fig. 11 - Normalized Thermal Transient Impedance, Junction-to-Case

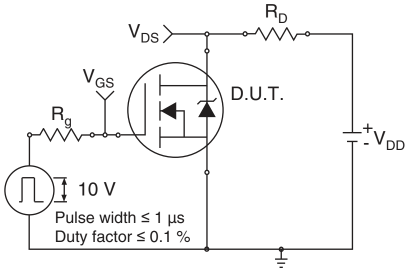


Fig. 12 - Switching Time Test Circuit

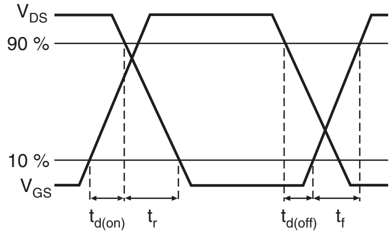


Fig. 13 - Switching Time Waveforms

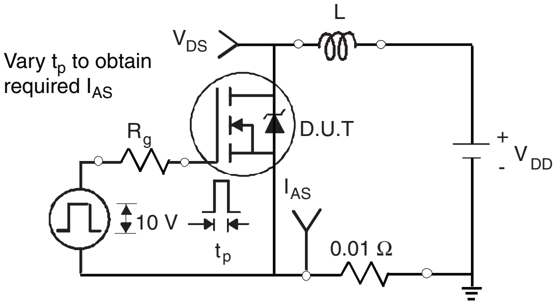


Fig. 14 - Unclamped Inductive Test Circuit

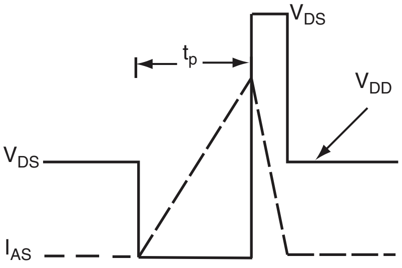


Fig. 15 - Unclamped Inductive Waveforms

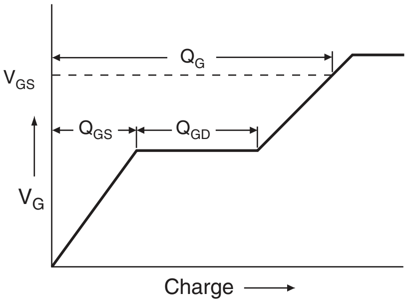


Fig. 16 - Basic Gate Charge Waveform

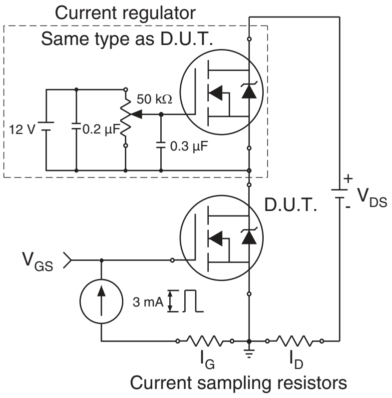
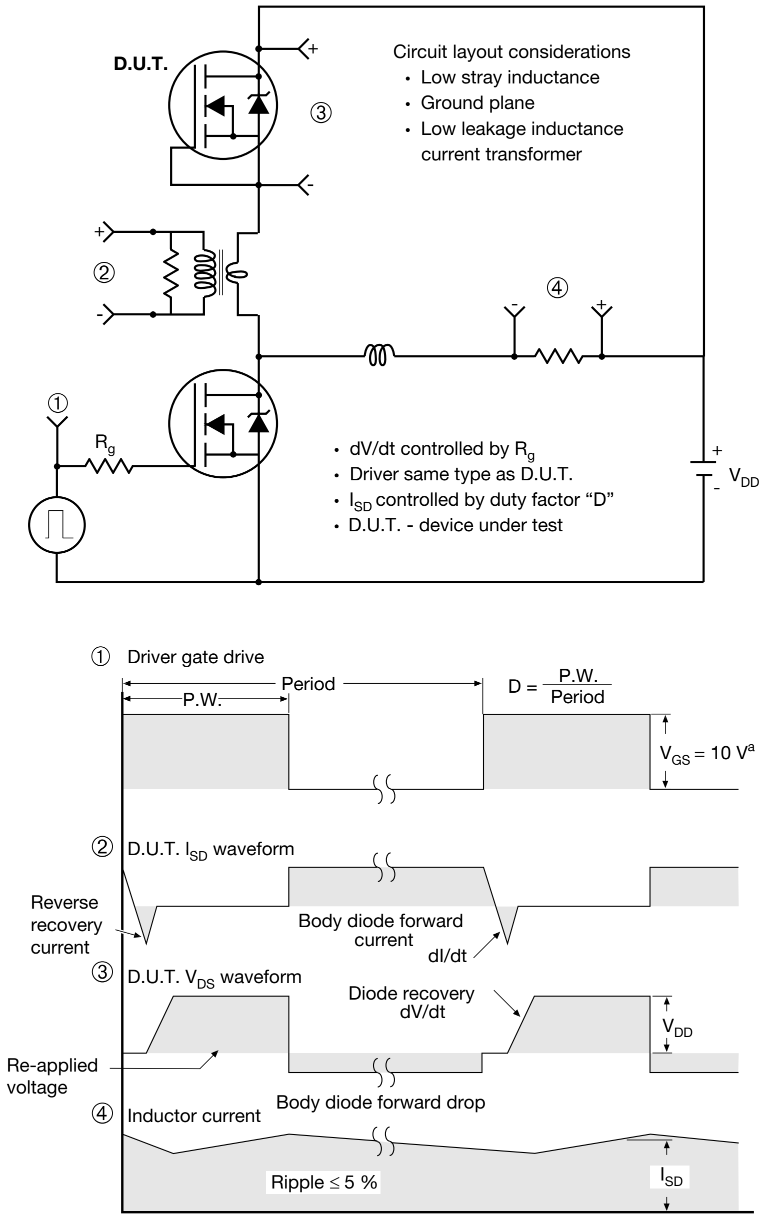


Fig. 17 - Gate Charge Test Circuit

Peak Diode Recovery dV/dt Test Circuit



Circuit layout considerations
- Low stray inductance
- Ground plane
- Low leakage inductance current transformer

- dV/dt controlled by R_g
- Driver same type as D.U.T.
- I_{SD} controlled by duty factor "D"
- D.U.T. - device under test

Note

a. V_{GS} = 5 V for logic level devices

Fig. 18 - For N-Channel

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