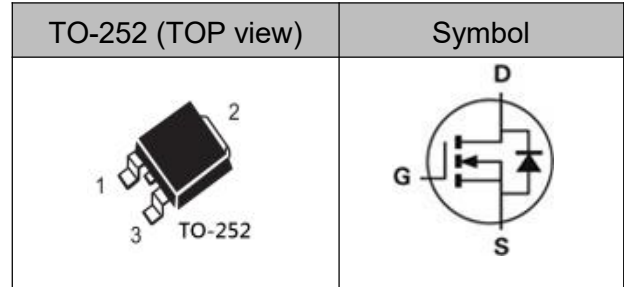


Features

- ◆ 60V, 110A, $R_{DS(ON)}(Typ.) = 3.0m\Omega @ V_{GS} = 10V$.
- ◆ Reliable and Rugged
- ◆ Fast Switching Speed
- ◆ Green Device Available
- ◆ 100% EAS Guaranteed

Application

- ◆ High Frequency Switching and Synchronous
- ◆ DC/DC Converter



Absolute Maximum Ratings $T_A = 25^\circ C$ unless otherwise noted

Symbol	Parameter	Rating	Unit
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	± 20	
I_D	Drain Current-Continuous, $T_C = 25^\circ C$	110	A
	Drain Current-Continuous, $T_C = 100^\circ C$	70	
	Drain Current-Continuous, $T_A = 25^\circ C$	20	
	Drain Current-Continuous, $T_A = 70^\circ C$	16	
I_{DM}	Drain Current-Pulsed ^a	220	
E_{AS}	Avalanche Energy, Single pulse ^b	135	mJ
I_{AS}	Avalanche Current	52	A
P_D	Total Power Dissipation @ $T_C = 25^\circ C$	86	W
	Total Power Dissipation @ $T_C = 100^\circ C$	34	
	Total Power Dissipation @ $T_A = 25^\circ C$	3.0	
	Total Power Dissipation @ $T_A = 70^\circ C$	1.9	
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to 150	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JC}$	Thermal Resistance Junction-Case	1.45	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ^c	42	$^\circ C/W$
$R_{\theta JT}$	Thermal Resistance Junction-Top of package ^c	15	$^\circ C/W$

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

■ Off Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	60	-	-	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	$I_D = 1mA$	-	21	-	mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 60V, V_{GS} = 0V$	-	-	1	μA
		$T_J = 55^\circ\text{C}$	-	-	5	
I_{GSS}	Forward Gate Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 20V$	-	-	± 100	nA

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.2	2.1	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		-	-7.1	-	mV/ $^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-Resistance ^d	$V_{GS} = 10V, I_D = 20A$	-	3.0	3.6	m Ω
		$V_{GS} = 4.5V, I_D = 20A$	-	4.3	5.2	
gfs	Forward Transconductance	$V_{DS} = 5V, I_D = 20A$	-	90	-	S

■ Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
R_g	Gate Resistance	$f = 1.0MHz$	-	0.4	-	Ω
C_{iss}	Input Capacitance	$V_{DS} = 30V, V_{GS} = 0V, f = 1.0MHz$	-	4500	-	pF
C_{oss}	Output Capacitance		-	1230	-	
C_{rss}	Reverse Transfer Capacitance		-	39	-	
$t_{d(on)}$	Turn-On Delay Time	$V_{DS} = 30V, I_D = 20A, R_G = 3\Omega, V_{GS} = 10V$	-	17	-	ns
t_r	Turn-On Rise Time		-	29	-	
$t_{d(off)}$	Turn-Off Delay Time		-	54	-	
t_f	Turn-Off Fall Time		-	11	-	
Q_g	Total Gate Charge	$V_{DS} = 30V, I_D = 20A, V_{GS} = 10V$	-	70	-	nC
Q_g	Total Gate Charge	$V_{DS} = 30V, I_D = 20A, V_{GS} = 4.5V$	-	34	-	
Q_{gs}	Gate-Source Charge		-	16	-	
Q_{gd}	Gate-Drain Charge		-	12	-	
V_{gp}	Gate Plateau Voltage		-	3.4	-	



■ Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G = V_D = 0V$, Force Current	-	-	110	A
I_{SM}	Pulse Source Current		-	-	220	A
V_{SD}	Drain-Source Diode Forward Voltage ^d	$V_{GS} = 0V$, $I_{SD} = 1A$	-	0.7	1.0	V
t_{rr}	Reverse Recovery Time	$I_F = 20A$, $V_{GS} = 0V$ $di/dt = 100A/\mu s$,	-	51	-	ns
Q_{rr}	Reverse Recovery Charge		-	50	-	nC

Notes:

- a: Max. current is limited by junction temperature.
- b: The EAS data shows Max. Rating. The test condition is $V_{DD} = 50V$, $V_{GS} = 10V$, $L = 0.1mH$, $I_{AS} = 52A$.
- c: Surface Mounted on 1in2 FR-4 board with 1oz.
- d: Pulse test (pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$).
- e: Guaranteed by design, not subject to production testing.

Typical Characteristics

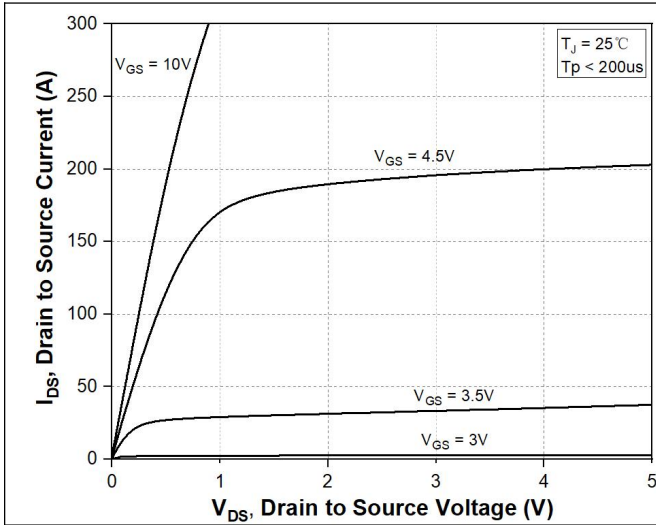


Figure 1. Typical Output Characteristics

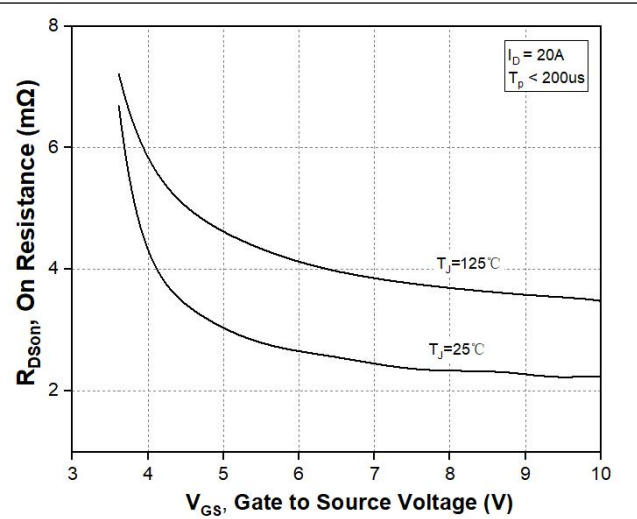


Figure 2. On-Resistance vs. Gate -Source

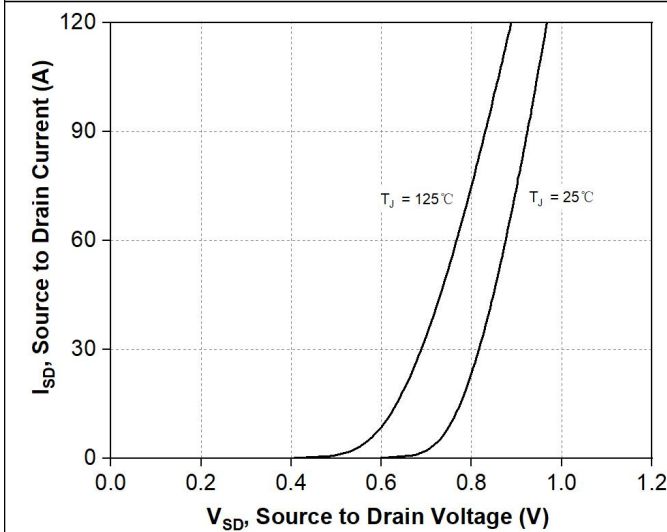


Figure 3. Forward Characteristics of Reverse

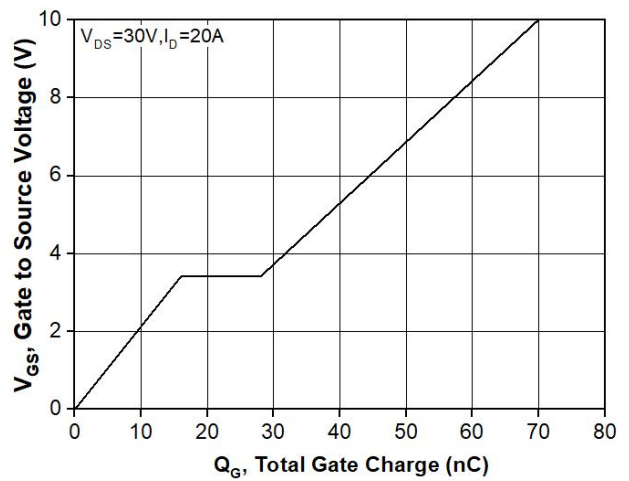


Figure 4. Gate-Charge Characteristics

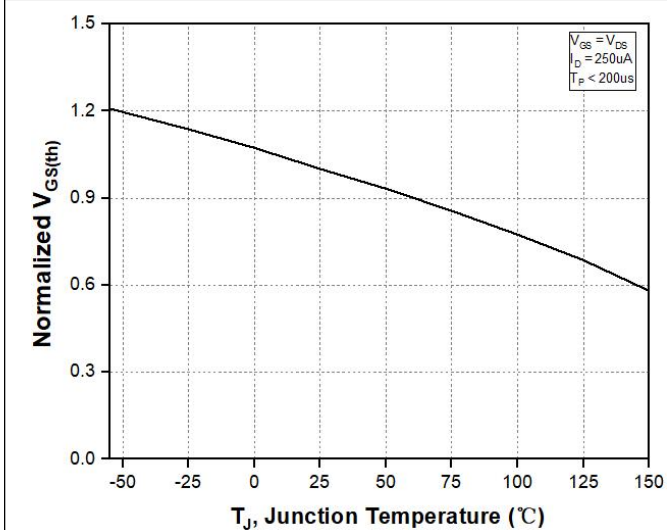


Figure 5. Normalized V_{GS(th)} vs. T_J

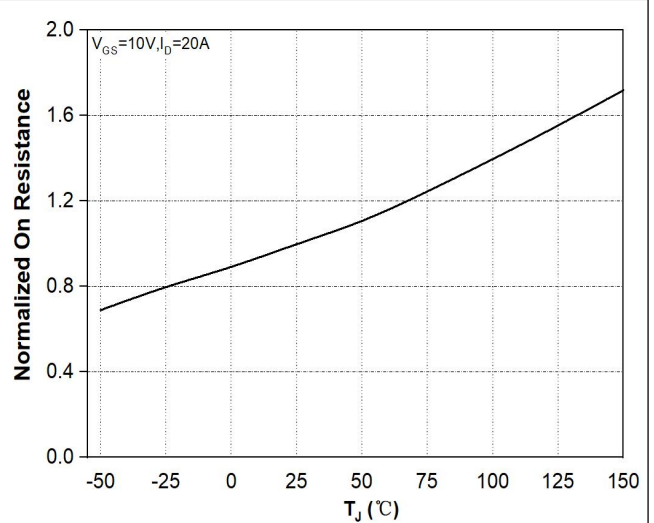


Figure 6. Normalized R_{DS(on)} vs. T_J

Typical Characteristics

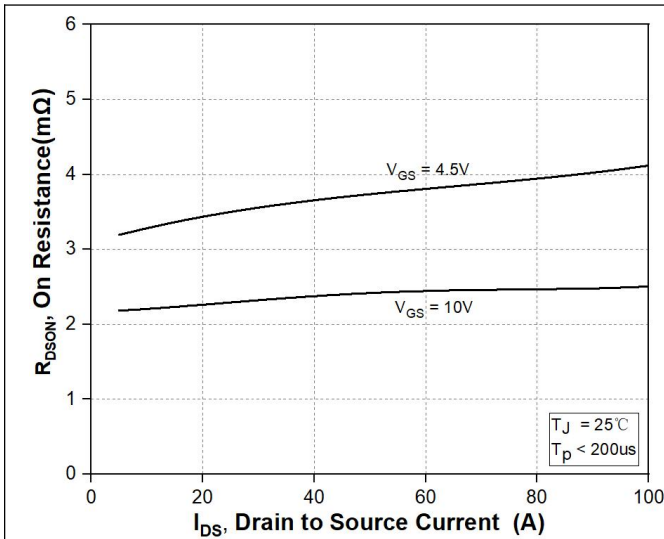


Figure 7. Drain-Source On-State Resistance

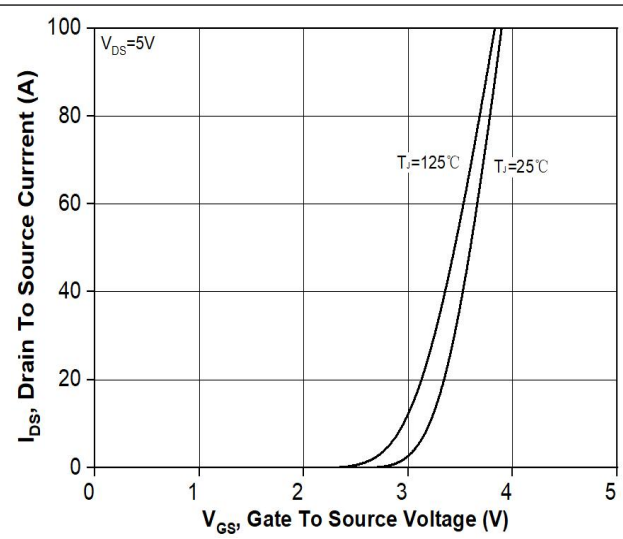


Figure 8. Transfer Characteristics

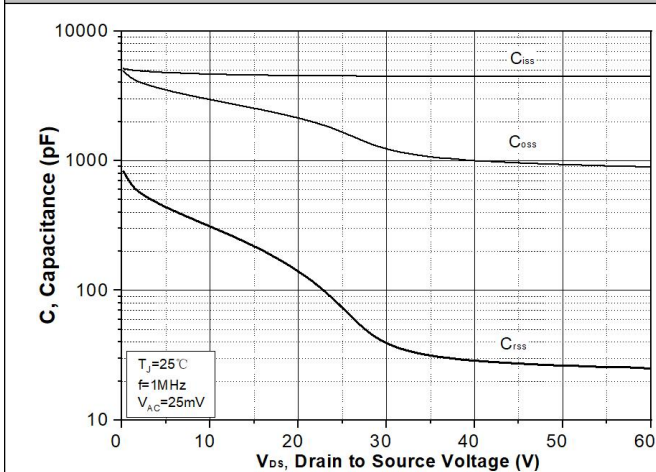


Figure 9. Capacitance

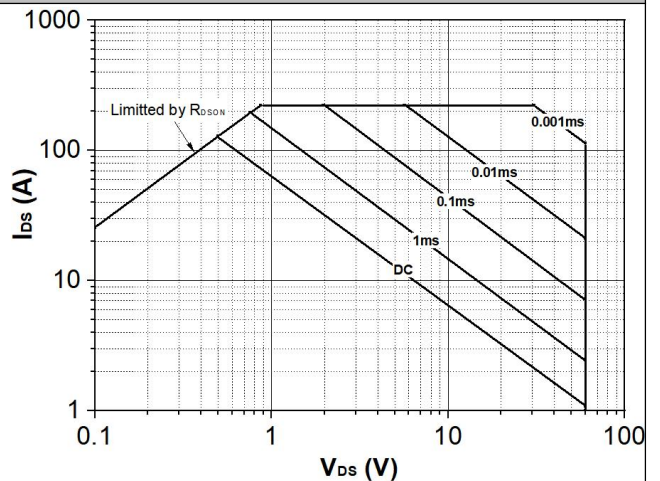


Figure 10. Safe Operating Area

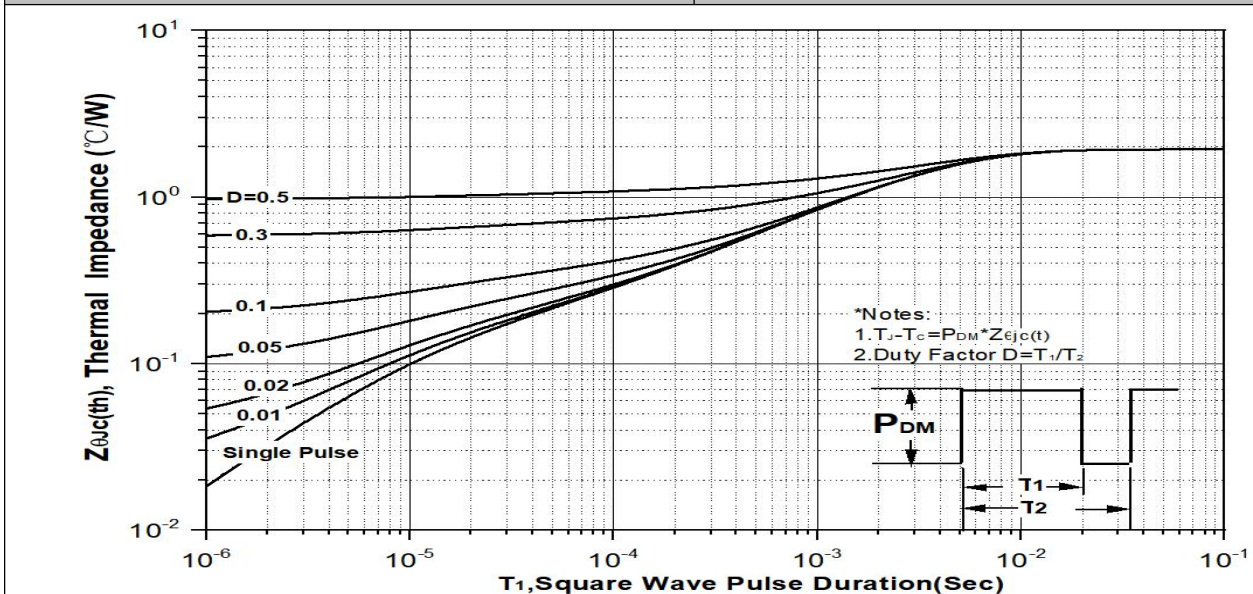


Figure 11. Transient Thermal Impedance

■ Package Information

TO-252

