

■ PRODUCT CHARACTERISTICS

N-Channel	P-Channel
$BV_{DSS} = 40V$	$BV_{DSS} = -40V$
$R_{DS(on)} (Typ@VGS = 10V) < 17m\Omega$	$R_{DS(on)}(Typ@VGS = -10V) < 29m\Omega$
$R_{DS(on)} (Typ@VGS = 4.5V) < 22m\Omega$	$R_{DS(on)}(Typ@VGS = -4.5V) < 34m\Omega$

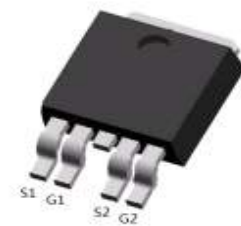
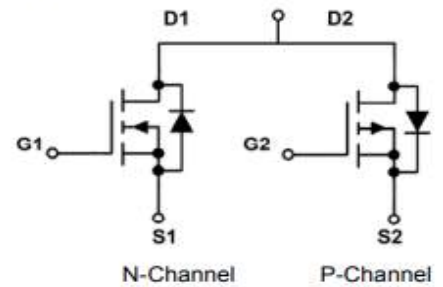
■ APPLICATIONS

- High Frequency Point-of-Load
- Networking DC-DC Power System
- CCFL Back-light Inverter

■ GENERAL DESCRIPTION

- Low gate charge.
- Excellent  $CdV/dt$  effect decline

Symbol



TO-252-4L

■ ORDER INFORMATION

Order codes		Package	Packing
Halogen-Free	Halogen		
N/A	MOT4025D	TO-252	2500 pieces /Reel

■ ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ C$ , unless otherwise specified)

Parameter	Symbol	N-channel	P-channel	Unit
Drain-Source Voltage	$V_{DS}$	40	-40	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	$\pm 20$	V
Continuous Drain Current	$I_D$	$T_C = 25^\circ C$	-15	A
		$T_C = 100^\circ C$	-10.6	A
Pulsed Drain Current <sup>(Note 1)</sup>	$I_{DM}$	70	-60	A
Maximum Power Dissipation $T_C = 25^\circ C$	$P_D$	35		W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150		$^\circ C$

■ N-Channel Electrical Characteristics ( $T_c=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	40	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=40V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b> (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.4	2.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=15A$	-	17	22	m $\Omega$
		$V_{GS}=4.5V, I_D=10A$	-	22	30	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=15A$	-	7	-	S
<b>Dynamic Characteristics</b> (Note 4)						
Input Capacitance	$C_{iss}$	$V_{DS}=20V, V_{GS}=0V,$ $F=1.0MHz$	-	964	-	PF
Output Capacitance	$C_{oss}$		-	109	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	96	-	PF
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=20V, R_L=2.5\Omega$ $V_{GS}=10V, R_G=3\Omega$	-	5.5	-	nS
Turn-on Rise Time	$t_r$		-	14	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	24	-	nS
Turn-Off Fall Time	$t_f$		-	5	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=20V, I_D=15A,$ $V_{GS}=10V$	-	22.9	-	nC
Gate-Source Charge	$Q_{gs}$		-	3.5	-	nC
Gate-Drain Charge	$Q_{gd}$		-	5.3	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=15A$	-	-	1.2	V
Diode Forward Current (Note 2)	$I_S$		-	-	28	A

**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production
5. EAS condition:  $T_j=25^\circ\text{C}, V_{DD}=20V, V_G=10V, L=0.5mH, R_g=25\Omega$

■ N-CHANNEL TEST CIRCUITS AND WAVEFORMS

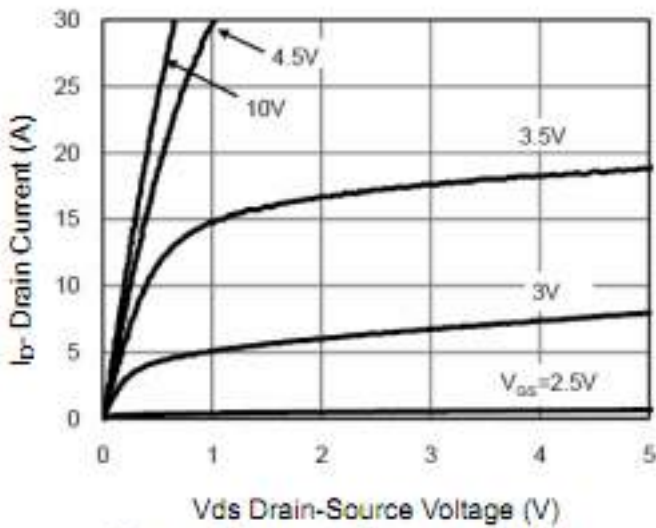


Figure 1 Output Characteristics

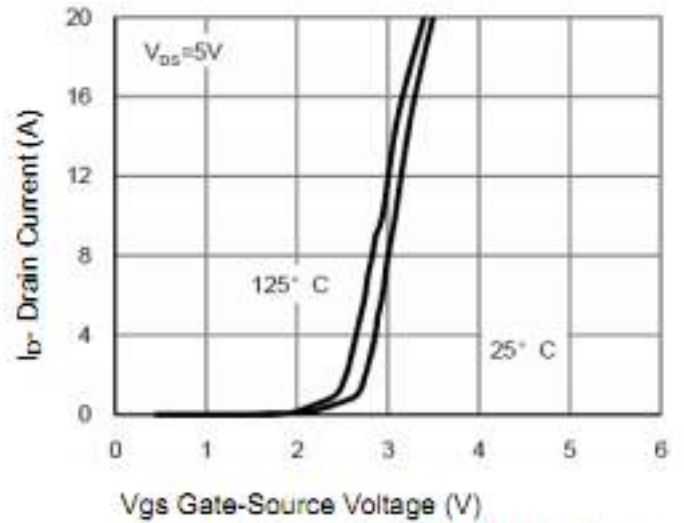


Figure 2 Transfer Characteristics

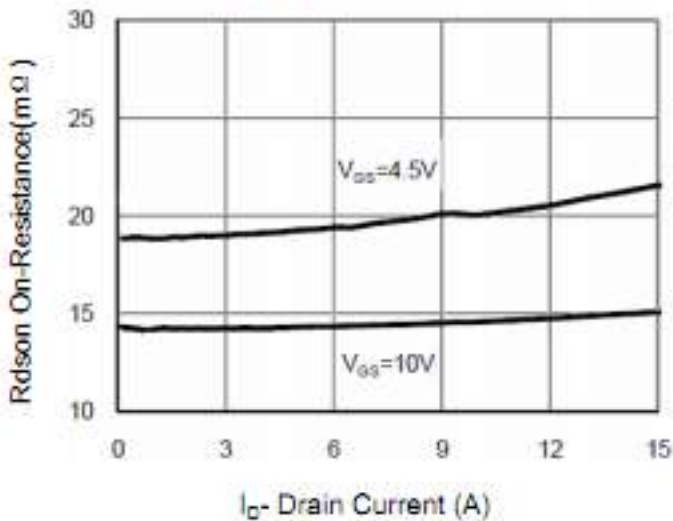


Figure 3 Drain-Source On-Resistance

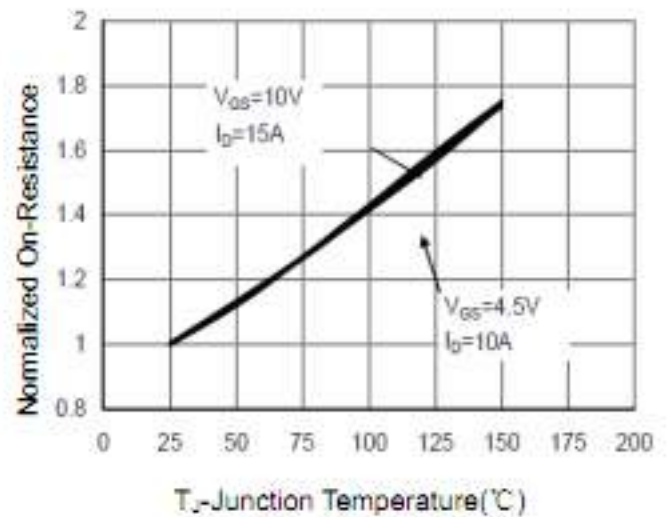


Figure 4 Drain-Source On-Resistance

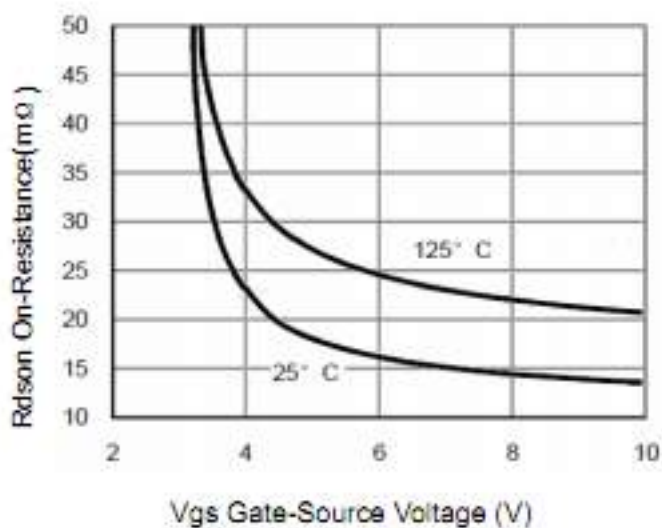


Figure 5 Rdson vs Vgs

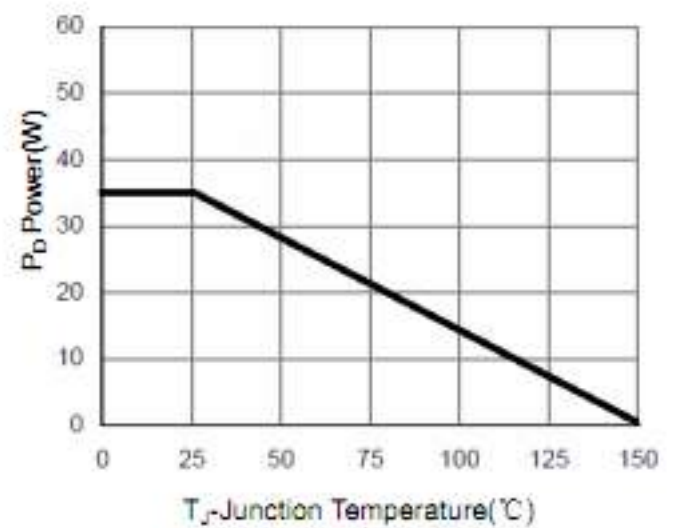


Figure 6 Power Dissipation

■ N-CHANNEL TEST CIRCUITS AND WAVEFORMS(Cont.)

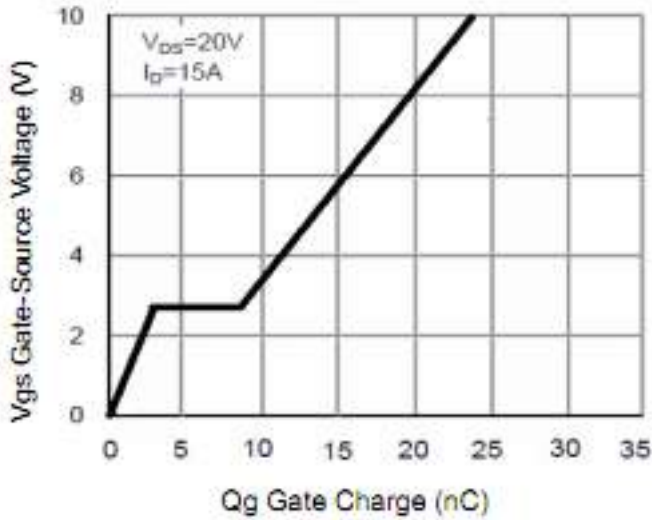


Figure 7 Gate Charge

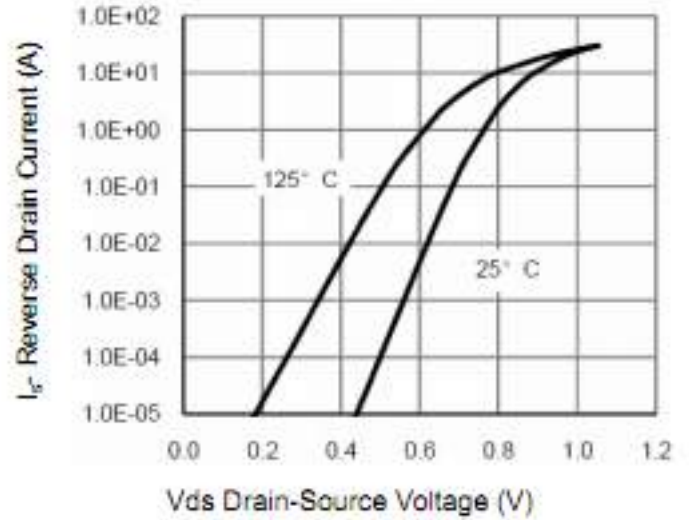


Figure 8 Source- Drain Diode Forward

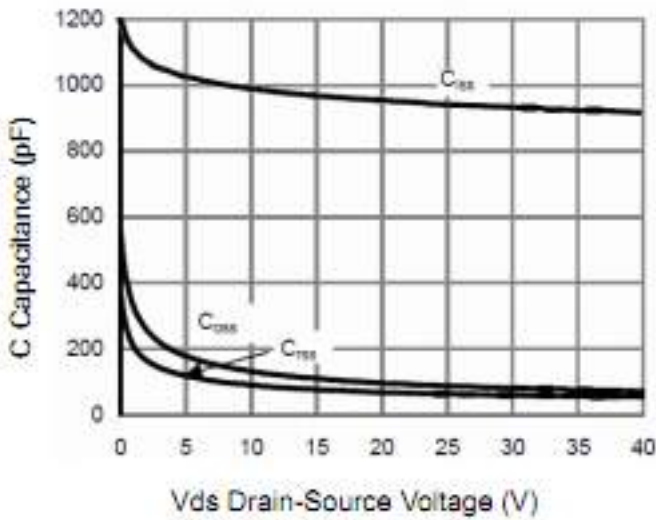


Figure 9 Capacitance vs Vds

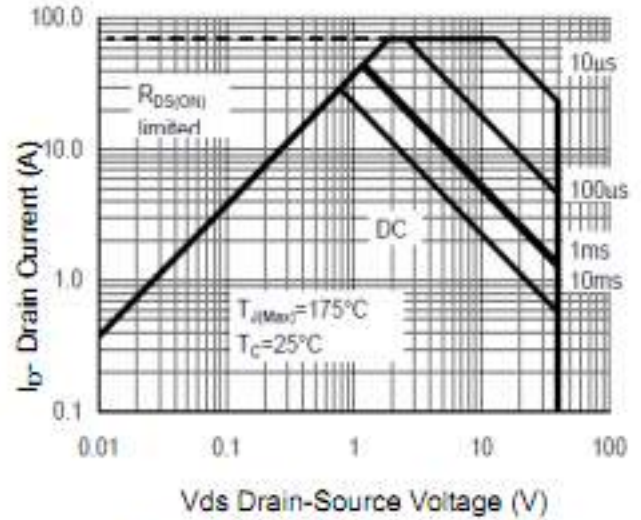


Figure 10 Safe Operation Area

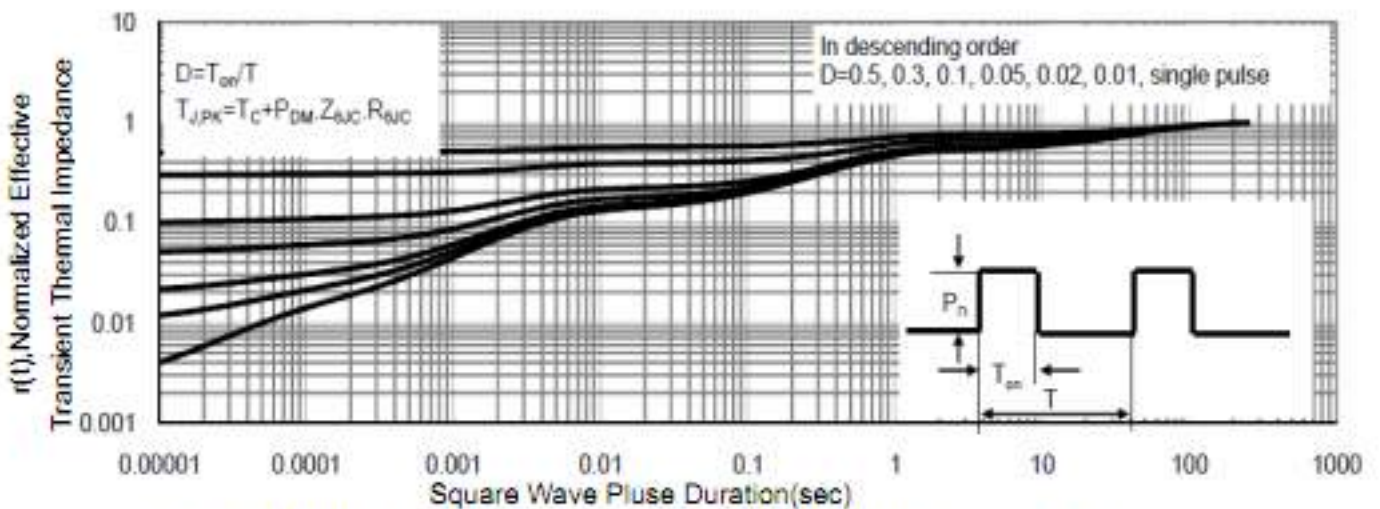


Figure 11 Normalized Maximum Transient Thermal Impedance

■ P-Channel Electrical Characteristics ( $T_c=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-40	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-40V, V_{GS}=0V$	-	-	-1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
On Characteristics <sup>(Note 3)</sup>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.0	-1.5	-2.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-7A$	-	29	35	m $\Omega$
		$V_{GS}=-4.5V, I_D=-4A$	-	34	45	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=-5V, I_D=-7A$	20	-	-	S
Dynamic Characteristics <sup>(Note4)</sup>						
Input Capacitance	$C_{ISS}$	$V_{DS}=-20V, V_{GS}=0V,$ $F=1.0MHz$	-	964	-	PF
Output Capacitance	$C_{OSS}$		-	109	-	PF
Reverse Transfer Capacitance	$C_{RSS}$		-	96	-	PF
Switching Characteristics <sup>(Note 4)</sup>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-20V, R_L=2.3\Omega$ $V_{GS}=-10V, R_{GEN}=6\Omega$	-	5.5	-	nS
Turn-on Rise Time	$t_r$		-	14	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	24	-	nS
Turn-Off Fall Time	$t_f$		-	12	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=-20V, I_D=-7A$ $V_{GS}=-10V$	-	22.9	-	nC
Gate-Source Charge	$Q_{gs}$		-	3.5	-	nC
Gate-Drain Charge	$Q_{gd}$		-	5.3	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage <sup>(Note 3)</sup>	$V_{SD}$	$V_{GS}=0V, I_S=-10A$	-	-	1.2	V



■ P-CHANNEL TEST CIRCUITS AND WAVEFORMS

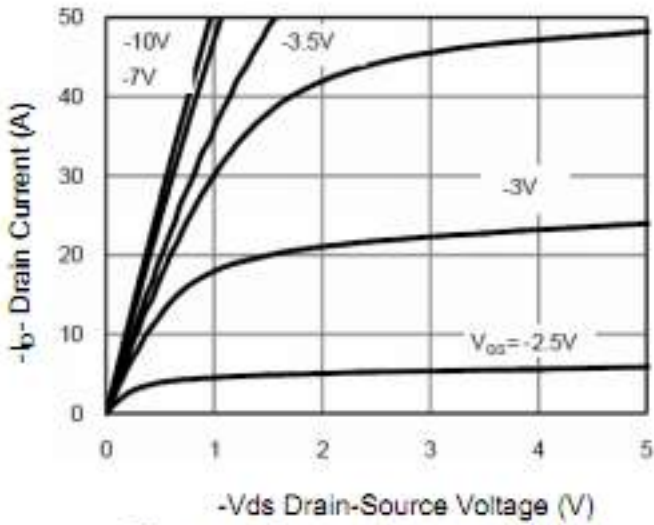


Figure 1 Output Characteristics

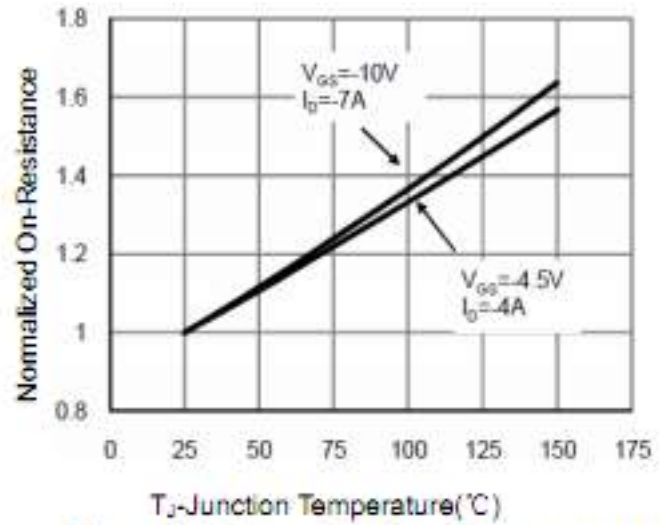


Figure 4  $R_{DS(on)}$ -Junction Temperature

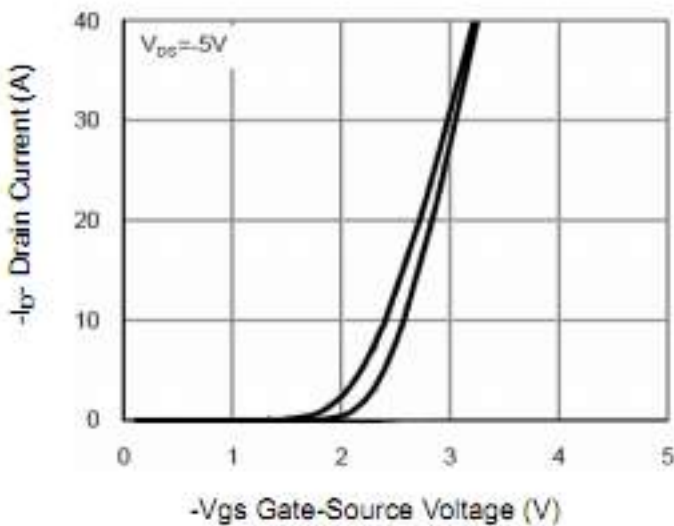


Figure 2 Transfer Characteristics

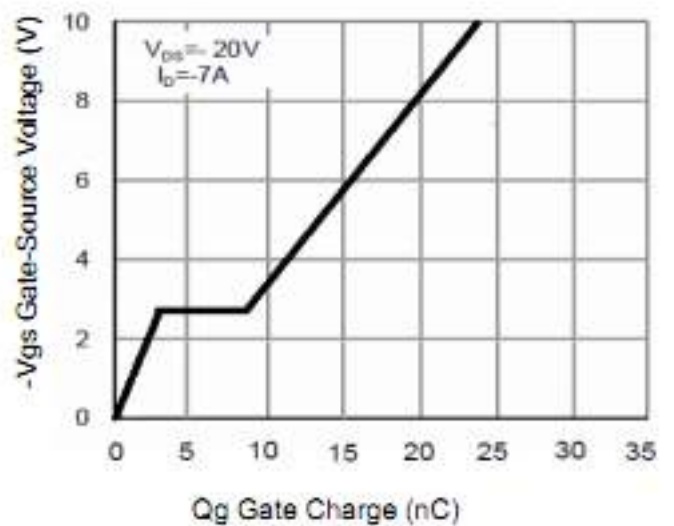


Figure 5 Gate Charge

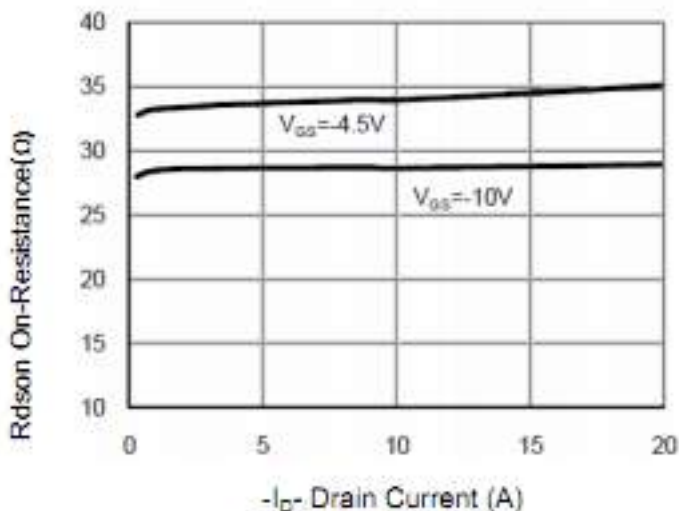


Figure 3  $R_{DS(on)}$ - Drain Current

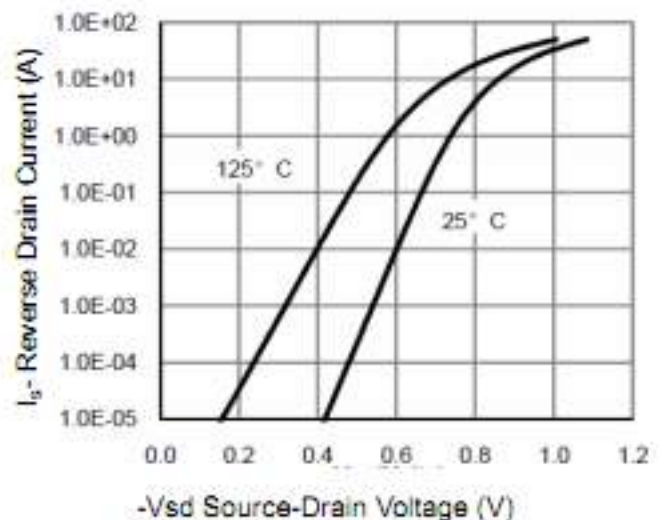


Figure 6 Source- Drain Diode Forward

■ P-CHANNEL TEST CIRCUITS AND WAVEFORMS(Cont.)

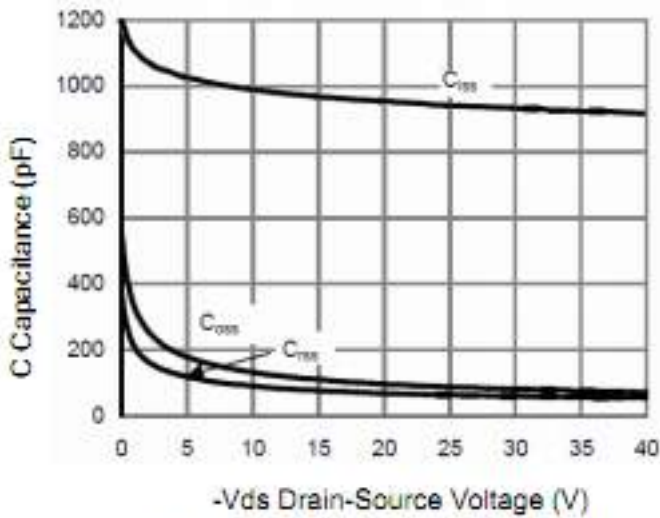


Figure 7 Capacitance vs Vds

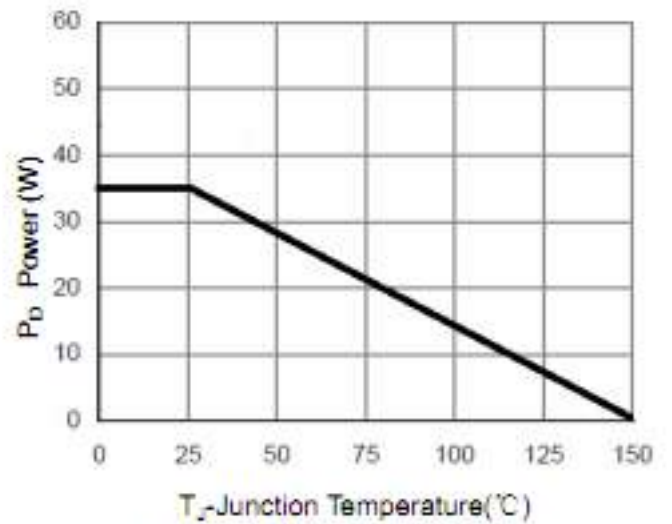


Figure 9 Power Dissipation

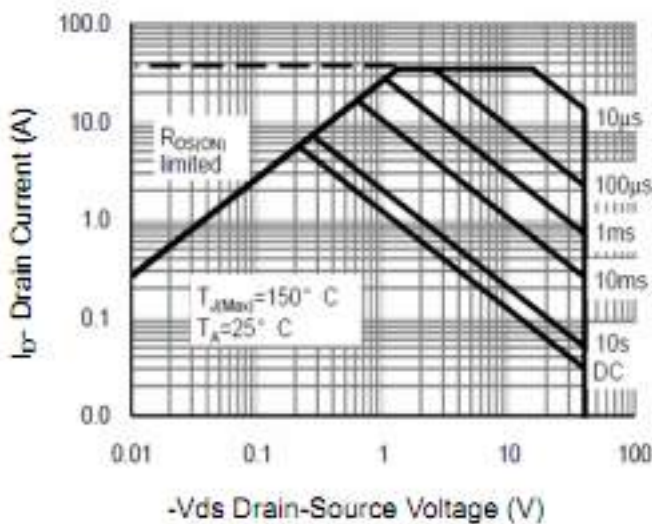


Figure 8 Safe Operation Area

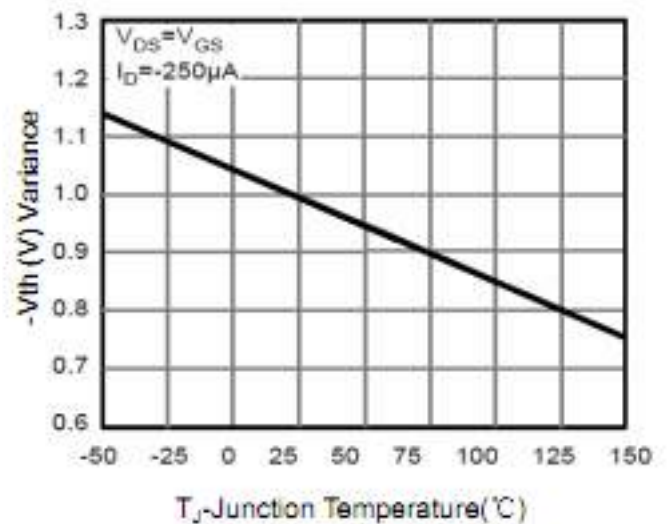


Figure 10  $V_{GS(th)}$  vs Junction Temperature

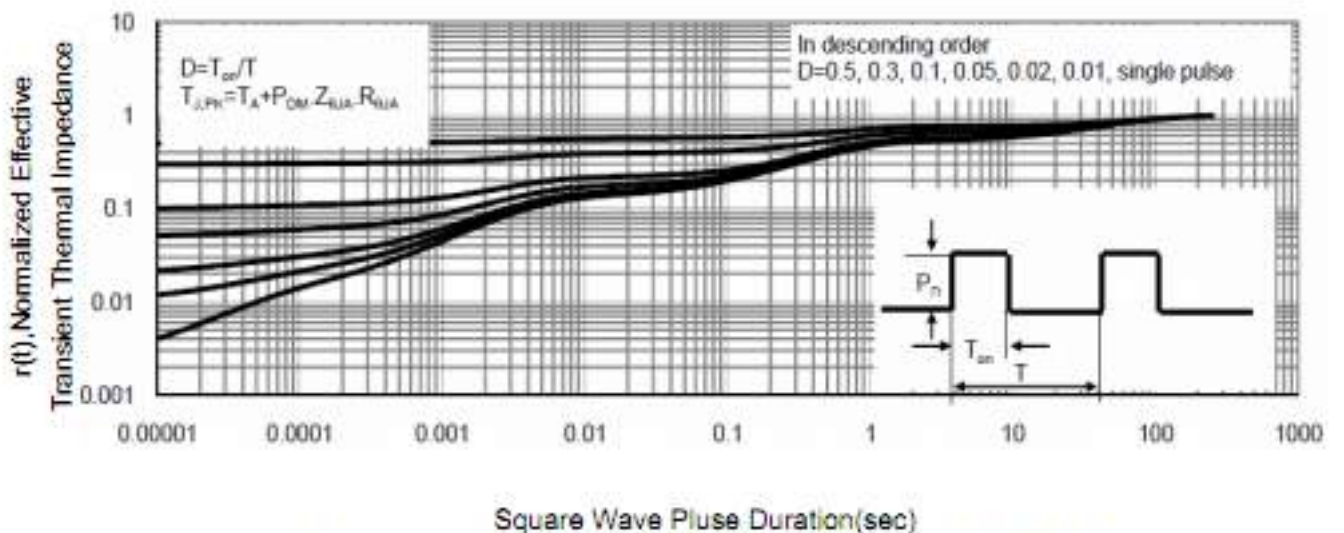


Figure 11 Normalized Maximum Transient Thermal Impedance

