Maximum Ratings N-CHANNEL – Q1 (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	30	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current (Note 6) V_{GS} = 10V	Steady State	T_A = +25°C T_A = +70°C	I_D	9.4 7.5	A
Continuous Drain Current (Note 6) V_{GS} = 10V	Steady State	T_C = +25°C T_C = +70°C	I_D	14 14	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	70	A
Avalanche Current, (Notes 7) L = 0.1mH			I_{AS}	16	A
Avalanche Energy, (Notes 7) L = 0.1mH			E_{AS}	13	mJ

Maximum Ratings P-CHANNEL – Q2 (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	-30	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current (Note 6) V_{GS} = -10V	Steady State	T_A = +25°C T_A = +70°C	I_D	-6.8 -5.3	A
Continuous Drain Current (Note 6) V_{GS} = -10V	Steady State	T_C = +25°C T_C = +70°C	I_D	-14 -14	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	-50	A
Avalanche Current, (Notes 7) L = 0.1mH			I_{AS}	-16	A
Avalanche Energy, (Notes 7) L = 0.1mH			E_{AS}	13	mJ

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	2.7	W
	T_A = +70°C		1.7	
Total Power Dissipation (Note 6)	T_C = +25°C		22	
	T_C = +70°C		14	
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	$R_{\theta JA}$	46	°C/W
Thermal Resistance, Junction to Case (Note 6)	Steady state	$R_{\theta JC}$	5.5	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Notes:
5. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate
7. I_{AS} and E_{AS} rating are based on low frequency and duty cycles to keep T_J = 25°C
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

Electrical Characteristics N-CHANNEL – Q1 (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	30	—	—	V	V_{GS} = 0V, I_D = 250μA
Zero Gate Voltage Drain Current @T_C = +25°C	I_{DSS}	—	—	1.0	μA	V_{DS} = 30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(th)}$	1	1.5	2.1	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	14	21	mΩ	V_{GS} = 10V, I_D = 7A
		—	18	32		V_{GS} = 4.5V, I_D = 5.6A
Forward Transfer Admittance	$\|Y_{fs}\|$	—	8.5	—	S	V_{DS} = 5V, I_D = 7A
Diode Forward Voltage	V_{SD}	—	0.7	1.0	V	V_{GS} = 0V, I_S = 1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	751	—	pF	V_{DS} = 10V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	121	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	110	—	pF	
Gate Resistance	R_g	—	1.5	—	Ω	V_{DS} = 10V, V_{GS} = 0V,f = 1.0MHz
Total Gate Charge (4.5V)	Q_g	—	9	—	nC	V_{GS} = 10V, V_{DS} = 15V, I_D = 6A
Total Gate Charge (10V)	Q_g	—	17.4	—	nC	
Gate-Source Charge	Q_{gs}	—	2.2	—	nC	
Gate-Drain Charge	Q_{gd}	—	3	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	2.5	—	ns	V_{DD} = 15V, V_{GS} = 10V, R_G = 6Ω, R_L = 1.8Ω, I_D = 6.7A
Turn-On Rise Time	t_r	—	6.6	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	19.0	—	ns	
Turn-Off Fall Time	t_f	—	6.3	—	ns	

Notes: 8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

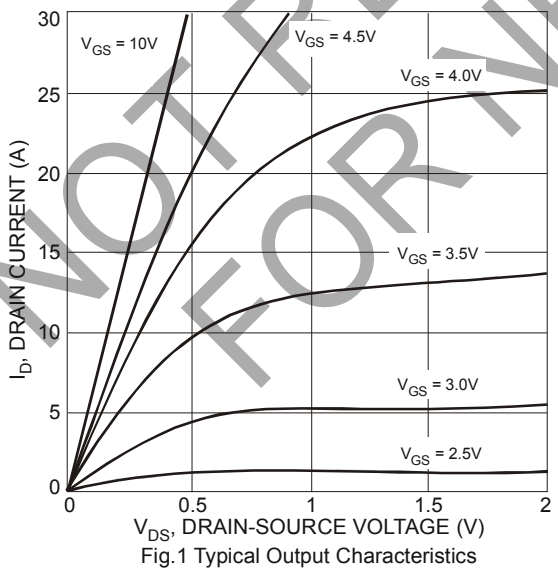


Fig.1 Typical Output Characteristics

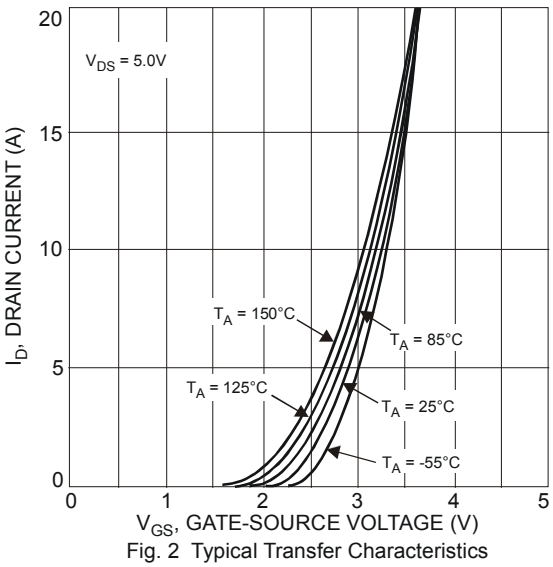


Fig. 2 Typical Transfer Characteristics

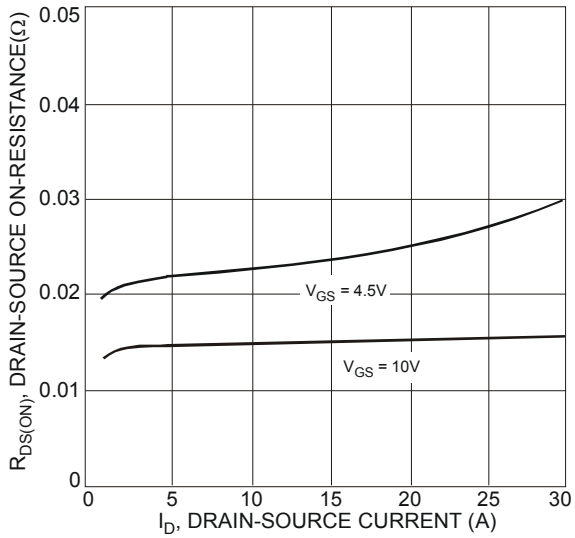


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

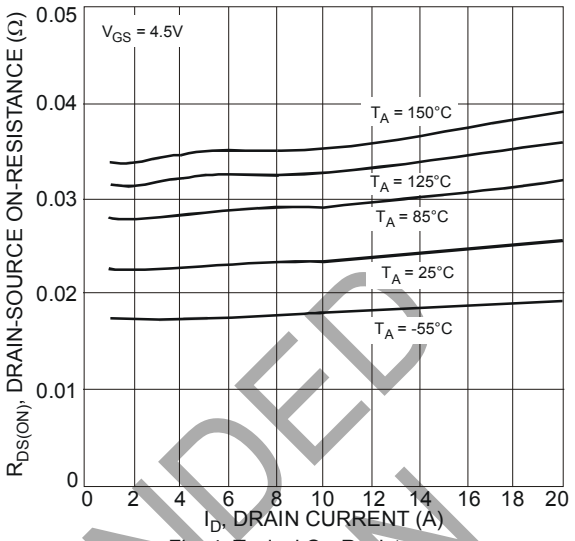


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

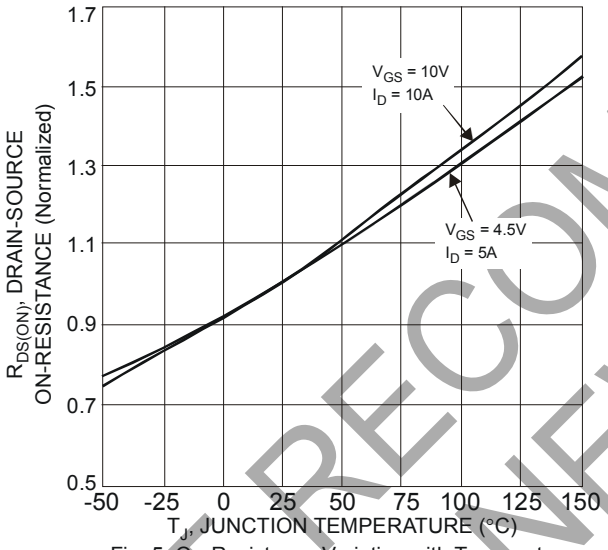


Fig. 5 On-Resistance Variation with Temperature

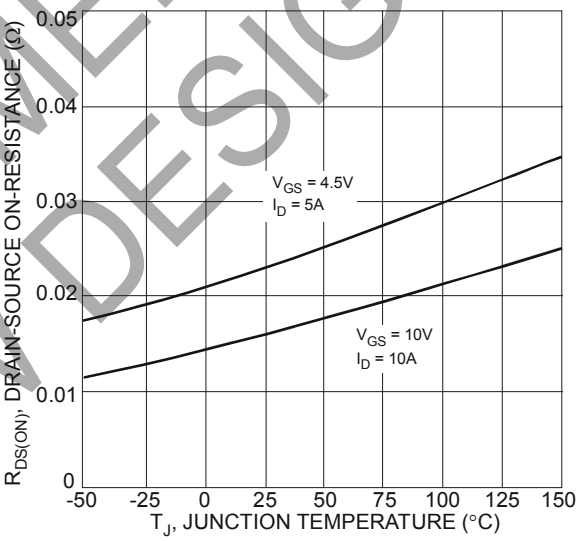


Fig. 6 On-Resistance Variation with Temperature

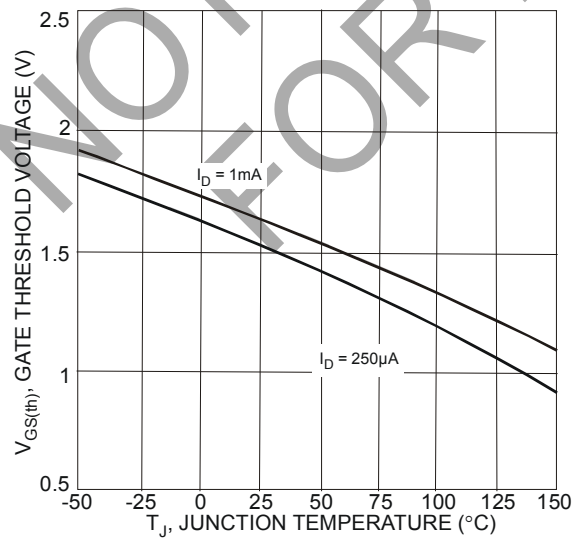


Fig. 7 On-Resistance Variation with Temperature

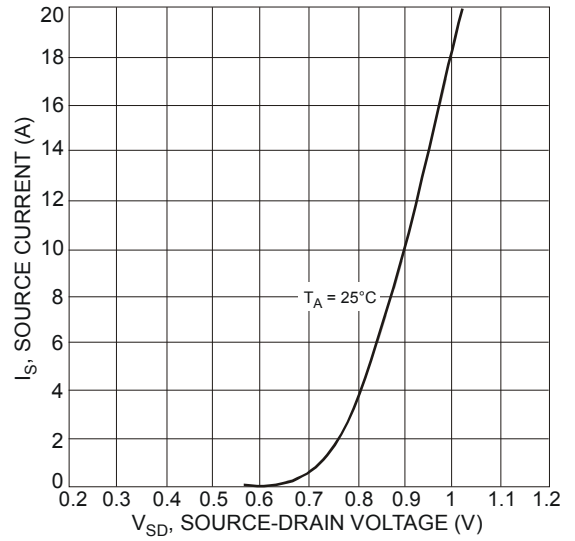


Fig. 8 Diode Forward Voltage vs. Current

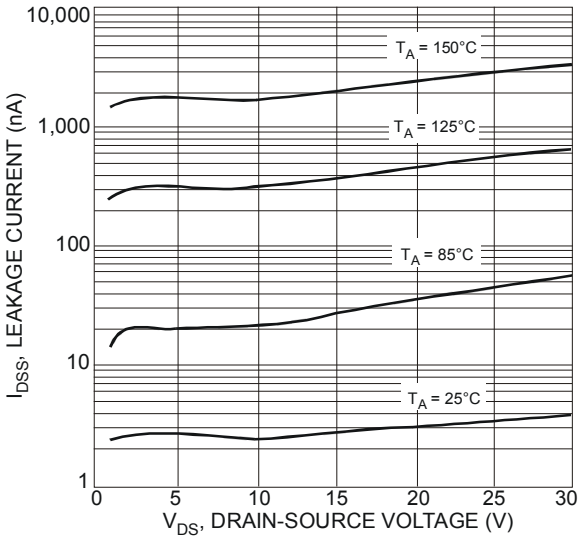


Fig. 9 Typical Drain-Source Leakage Current vs. Voltage

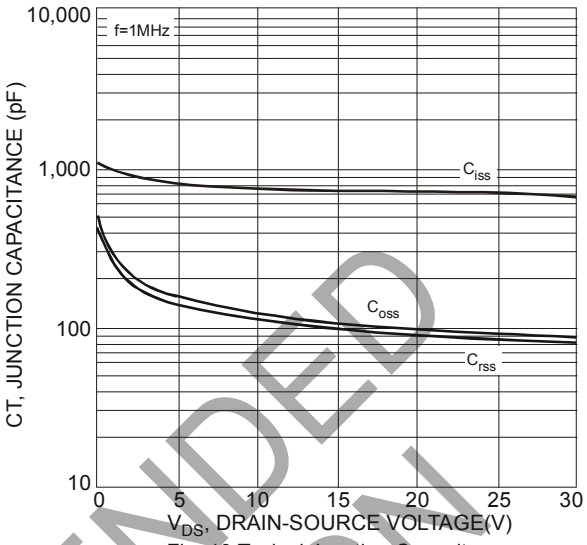


Fig. 10 Typical Junction Capacitance

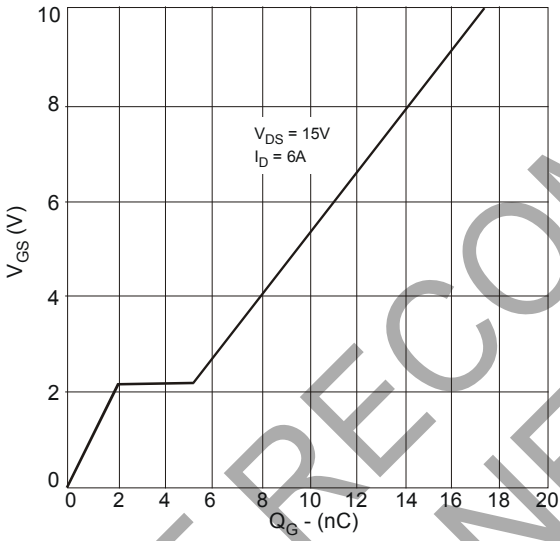


Fig. 11 Gate Charge Characteristics

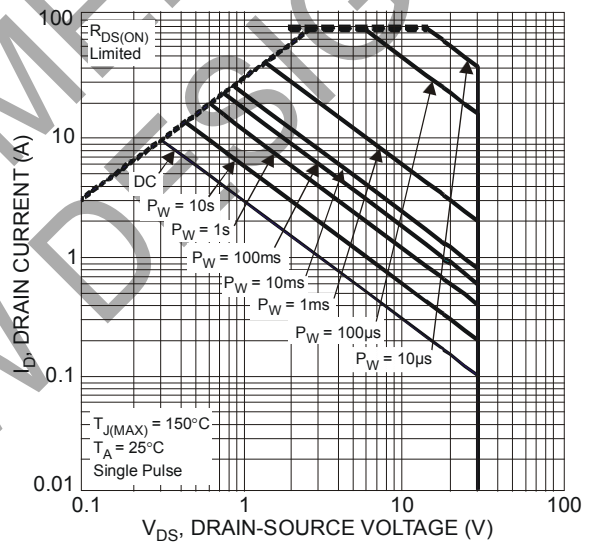


Fig. 12 SOA, Safe Operation Area

Electrical Characteristics P-CHANNEL – Q2 (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	-30	—	—	V	V_{GS} = 0V, I_D = -250μA
Zero Gate Voltage Drain Current @T_C = +25°C	I_{DSS}	—	—	-1	μA	V_{DS} = -30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(th)}$	-1	-1.7	-2.2	V	V_{DS} = V_{GS}, I_D = -250μA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	—	30	39	mΩ	V_{GS} = -10V, I_D = -4.3A
		—	42	53		V_{GS} = -4.5V, I_D = -3.7A
Forward Transfer Admittance	$\|Y_{fs}\|$	—	10	—	S	V_{DS} = -5V, I_D = -4.3A
Diode Forward Voltage	V_{SD}	—	-0.75	-1.0	V	V_{GS} = 0V, I_S = -1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	1039	—	pF	V_{DS} = -10V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	—	144	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	134	—	pF	
Gate Resistance	R_g	—	13	—	Ω	V_{DS} = 0V, V_{GS} = 0V,f = 1.0MHz
Total Gate Charge (4.5V)	Q_g	—	10.1	—	nC	V_{GS} = -10V, V_{DS} = -15V, I_D = -6A
Total Gate Charge (10V)	Q_g	—	21.1	—	nC	
Gate-Source Charge	Q_{gs}	—	2.8	—	nC	
Gate-Drain Charge	Q_{gd}	—	3.2	—	nC	
Turn-On Delay Time	$t_{D(on)}$	—	10.1	—	ns	V_{DS} = -15V, V_{GS} = -10V, R_G = 6Ω, I_D = -1A
Turn-On Rise Time	t_r	—	6.5	—	ns	
Turn-Off Delay Time	$t_{D(off)}$	—	50.1	—	ns	
Turn-Off Fall Time	t_f	—	22.2	—	ns	

Notes: 8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

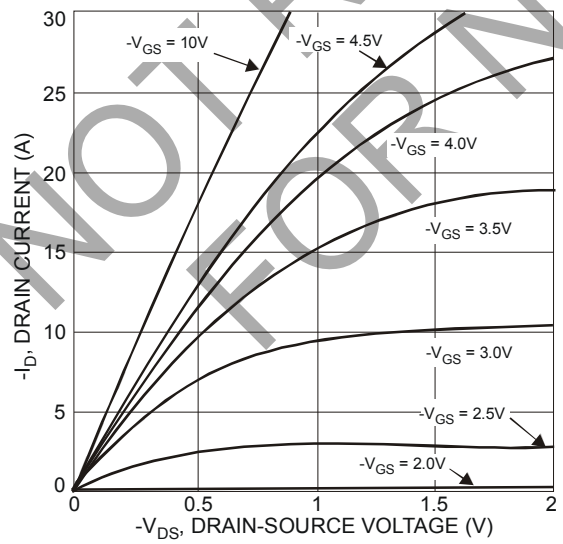


Fig.13 Typical Output Characteristics

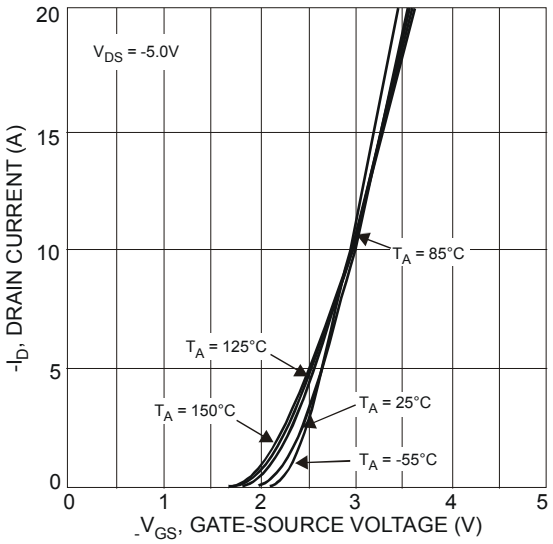


Fig. 14 Typical Transfer Characteristics

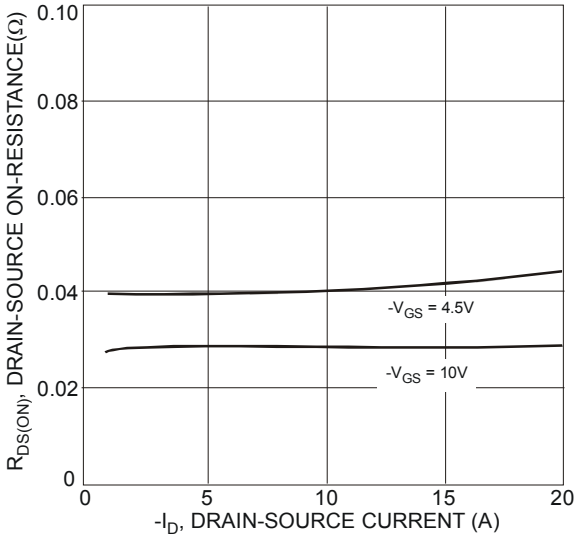


Fig. 15 Typical On-Resistance vs. Drain Current and Gate Voltage

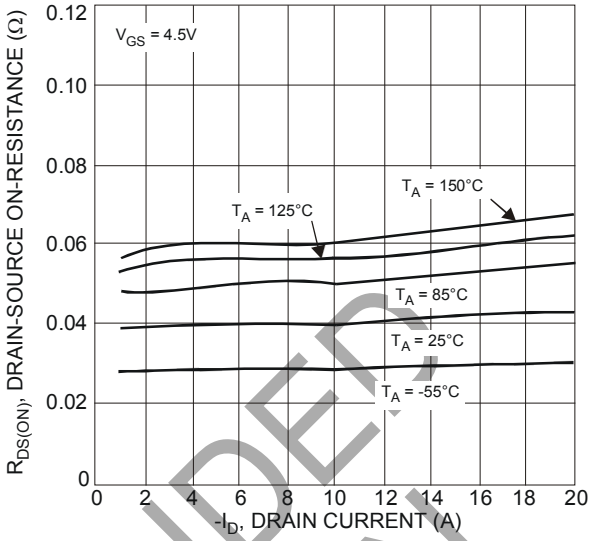


Fig. 16 Typical On-Resistance vs. Drain Current and Temperature

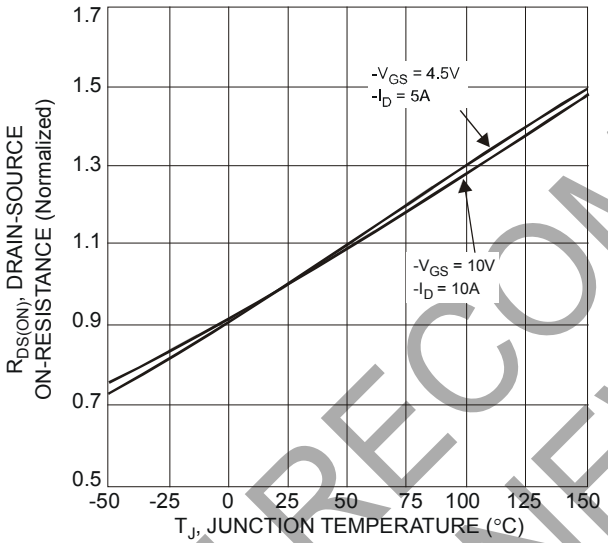


Fig. 17 On-Resistance Variation with Temperature

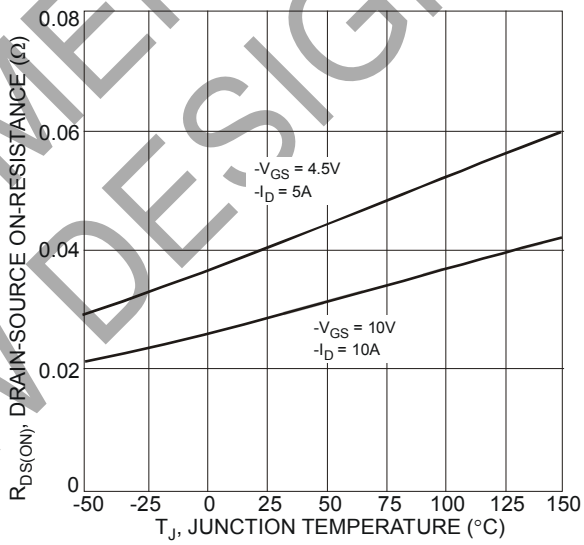


Fig. 18 On-Resistance Variation with Temperature

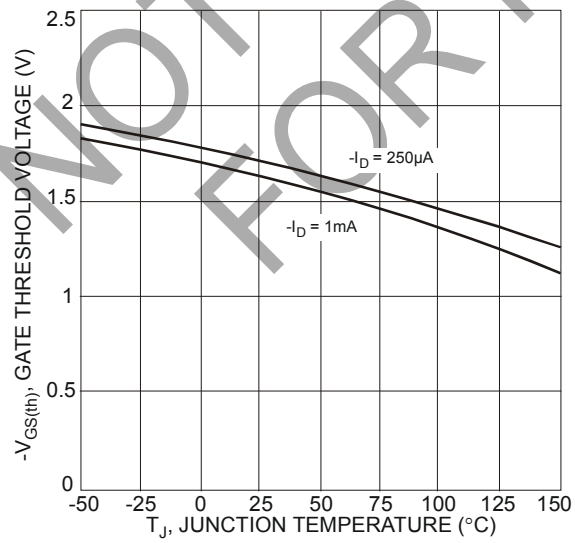


Fig. 19 On-Resistance Variation with Temperature

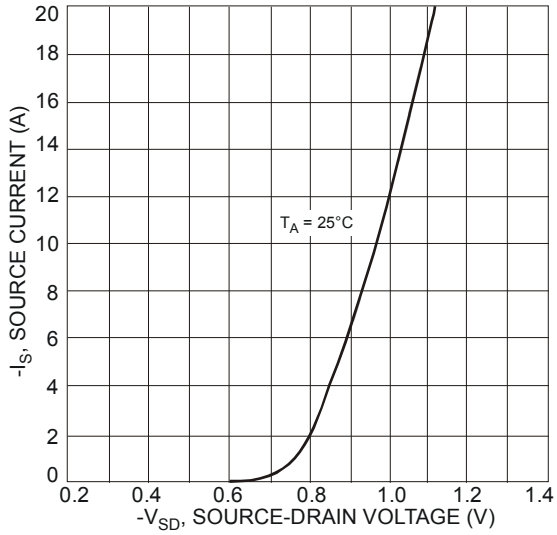


Fig. 20 Diode Forward Voltage vs. Current

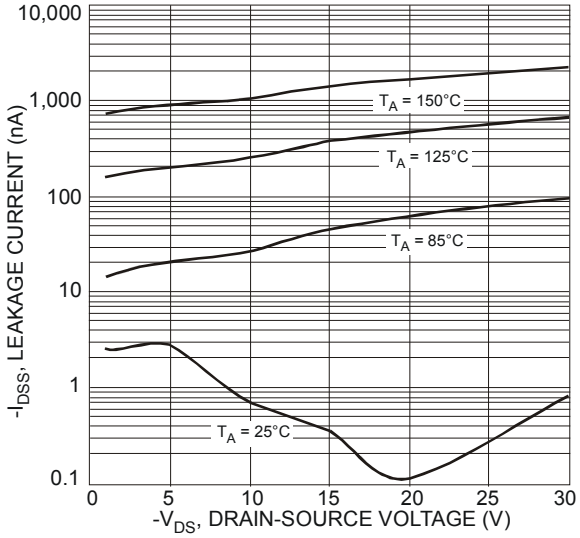


Fig. 21 Typical Drain-Source Leakage Current vs. Voltage

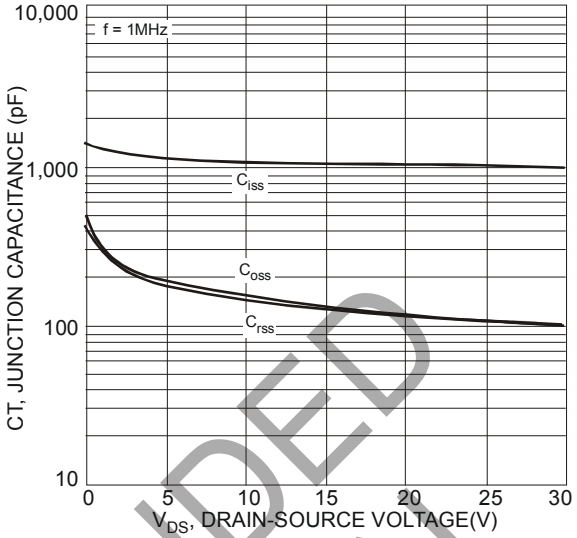


Fig. 22 Typical Junction Capacitance

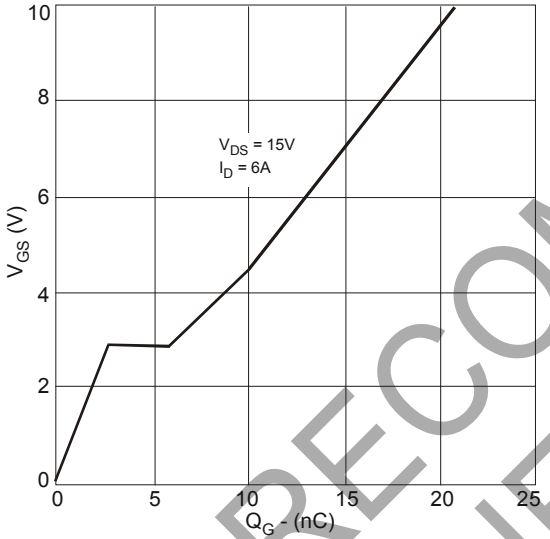


Fig. 23 Gate Charge Characteristics

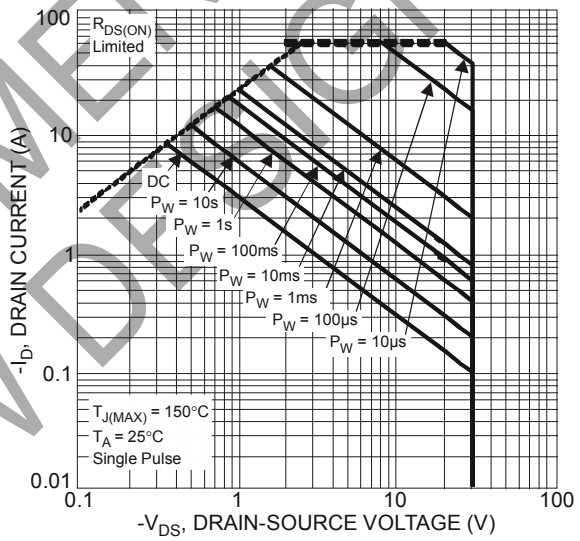


Fig. 24 SOA, Safe Operation Area

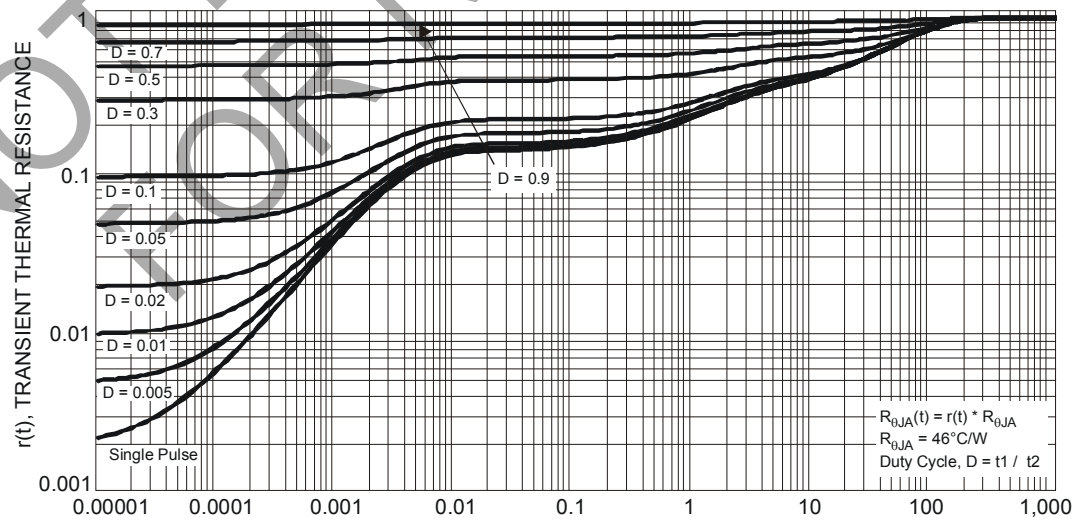
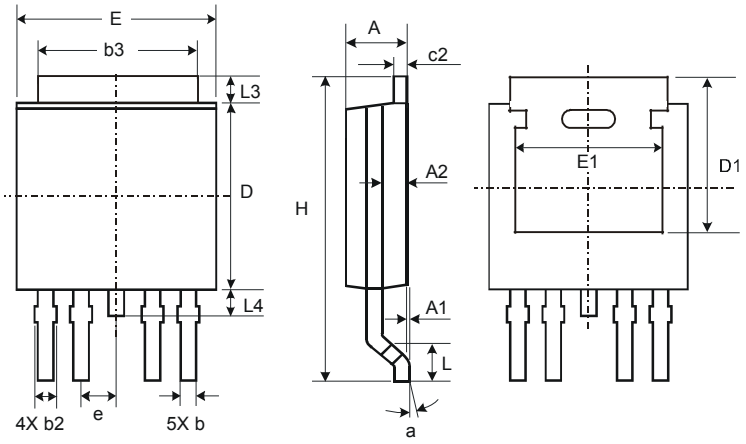


Fig. 25 Transient Thermal Resistance

Package Outline Dimensions

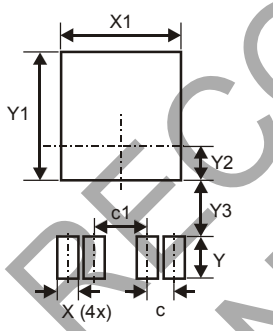
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for the latest version.



TO252-4			
Dim	Min	Max	Typ
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.51	0.71	0.583
b2	0.61	0.79	0.70
b3	5.21	5.46	5.33
c2	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	–	–
e	–	–	1.27
E	6.45	6.70	6.58
E1	4.32	–	–
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°	10°	–
All Dimensions in mm			

Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.



Dimensions	Value (in mm)
c	1.27
c1	2.54
X	1.00
X1	5.73
Y	2.00
Y1	6.17
Y2	1.64
Y3	2.66

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