

Product Summary

Device	V _{(BR)DSS}	R _{DS(ON)} max	I _D max T _C = 25°C
Q1	30V	21mΩ @ V _{GS} = 10V	14A
		32mΩ @ V _{GS} = 4.5V	14A
Q2	-30V	39mΩ @ V _{GS} = -10V	-14A
		53mΩ @ V _{GS} = -4.5V	-14A

Description and Applications

This MOSFET has been designed to minimize the on-state resistance (R_{DS(on)}) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

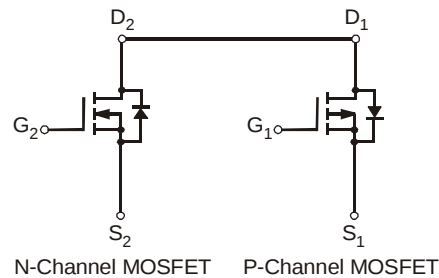
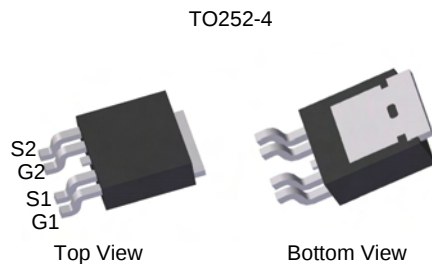
- Motor control
- Power Management Functions
- DC-DC Converters
- Backlighting

Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 standards for High Reliability**

Mechanical Data

- Case: TO252-4
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See diagram
- Terminals: Finish – Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 
- Weight: 0.027 grams (approximate)



Ordering Information (Note 4)

Part Number	Case	Packaging
DMC3021LK4-13	TO252-4	2500/Tape & Reel

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
 2. See <http://www.diodes.com> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. For packaging details, go to our website at <http://www.diodes.com>

Marking Information



D = Manufacturer's Marking
 C3021L = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 11 = 2011)
 WW = Week (01 - 53)

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 5) V _{GS} = 10V	Steady State	T _A = 25°C	I _D	9.4	A
		T _A = 70°C		7.5	
Continuous Drain Current (Note 6 & 7) V _{GS} = 10V	Steady State	T _C = 25°C	I _D	14	A
		T _C = 70°C		14	
Pulsed Drain Current (Note 8)			I _{DM}	70	A

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 5) 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 & 7) V _{GS} = -10V	Steady State	T _C = 25°C T _C = 70°C	I _D	-14 -14	A
Pulsed Drain Current (Note 8)			I _{DM}	-50	A

Thermal Characteristics @T_A = 25°C unless otherwise specified

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 5)	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 5)	Steady state	R _{θJA}	46	°C/W
Thermal Resistance, Junction to Case (Note 6)	Steady state	R _{θJC}	5.5	
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

- Notes:
- Device mounted on FR-4 substrate PC board, 2oz copper, on 1inch square copper plate.
 - Device mounted on infinite heatsinke, T_C is measured on the bottom of package
 - The maximum current rating is limited by bond-wires
 - Device mounted on minimum recommended pad layout test board, 10μs pulse duty cycle = 1%.

Electrical Characteristics N-CHANNEL – Q1 @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
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 9)						
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 10)						
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: 9. Short duration pulse test used to minimize self-heating effect
 10. Guaranteed by design. Not subject to product testing

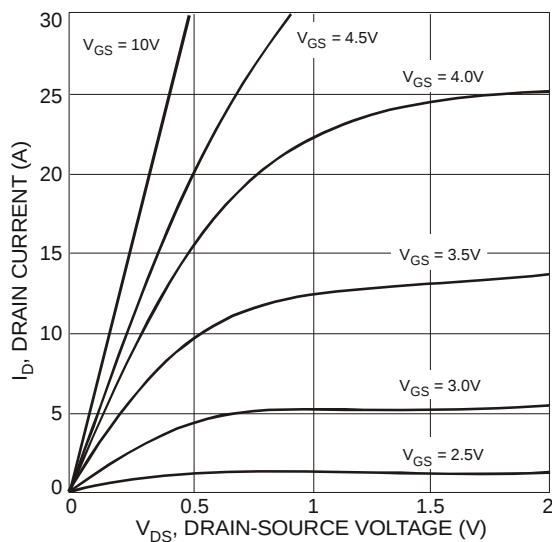


Fig.1 Typical Output Characteristics

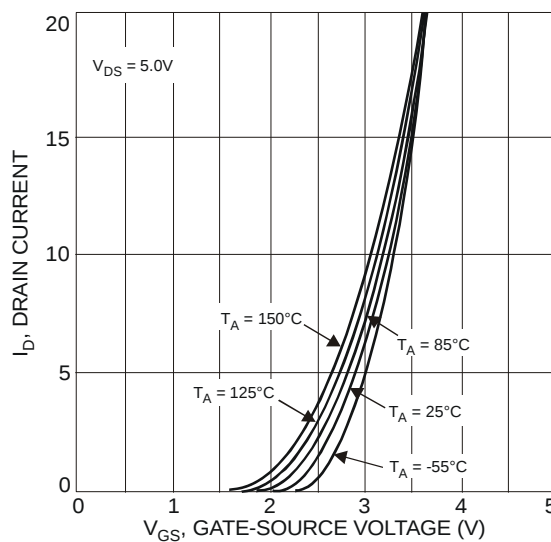


Fig. 2 Typical Transfer Characteristics

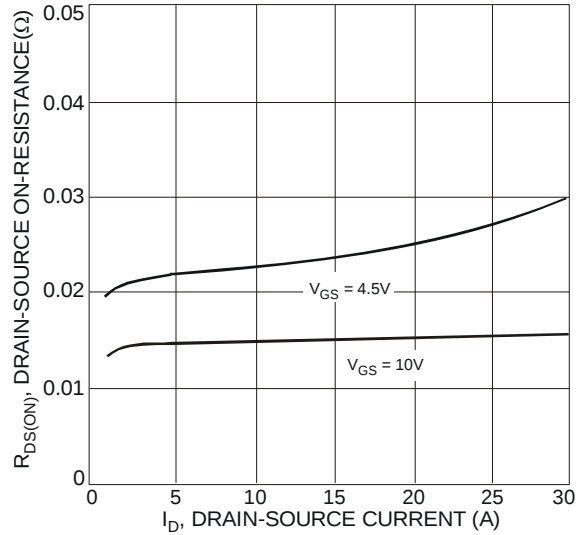


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

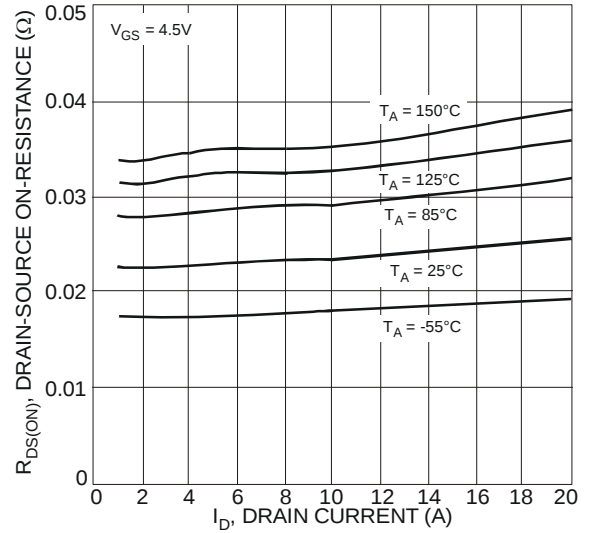


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

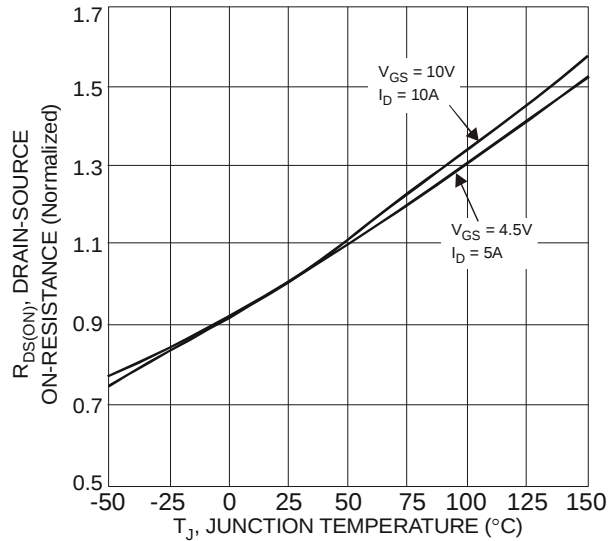


Fig. 5 On-Resistance Variation with Temperature

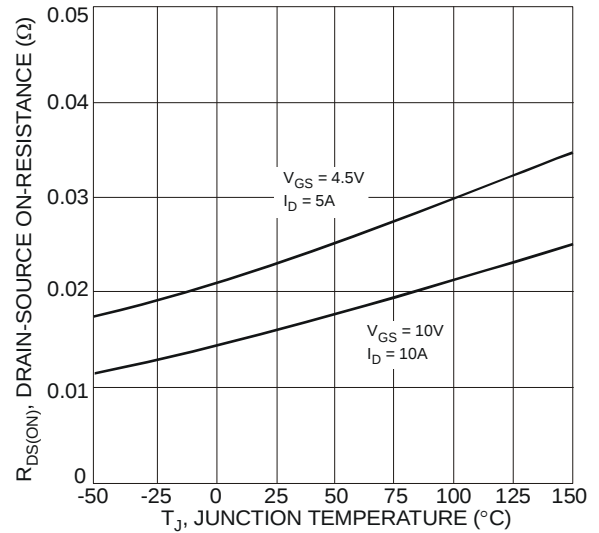


Fig. 6 On-Resistance Variation with Temperature

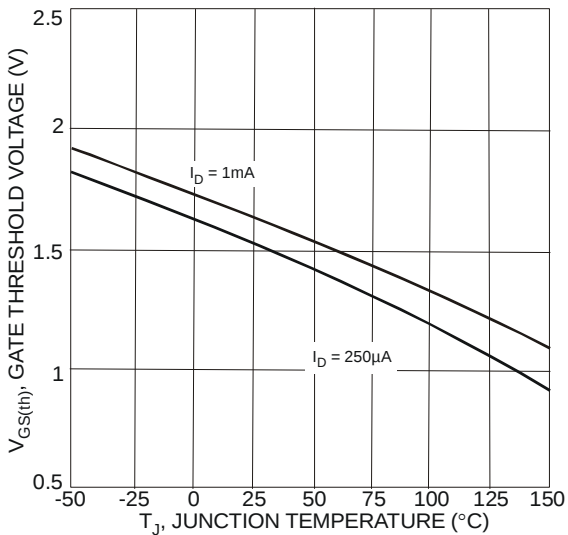


Fig. 7 On-Resistance Variation with Temperature

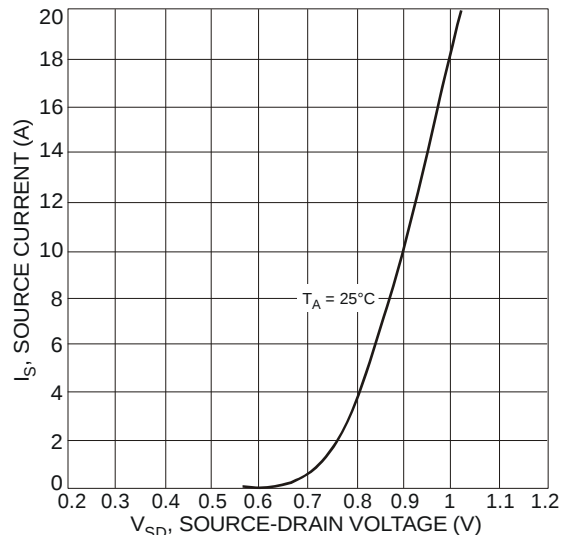


Fig. 8 Diode Forward Voltage vs. Current

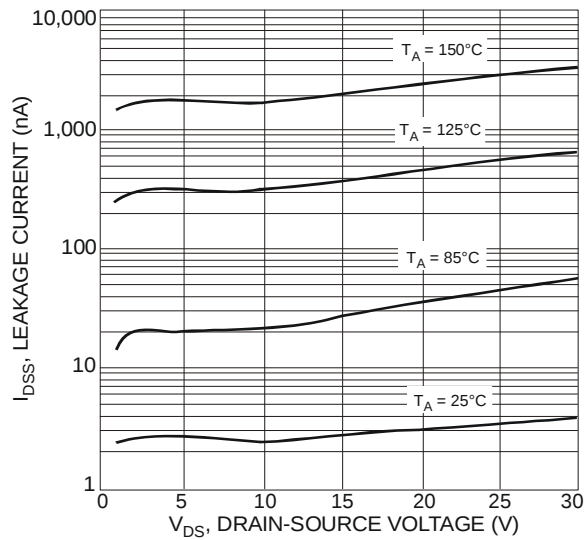


Fig. 9 Typical Drain-Source Leakage Current vs. Voltage

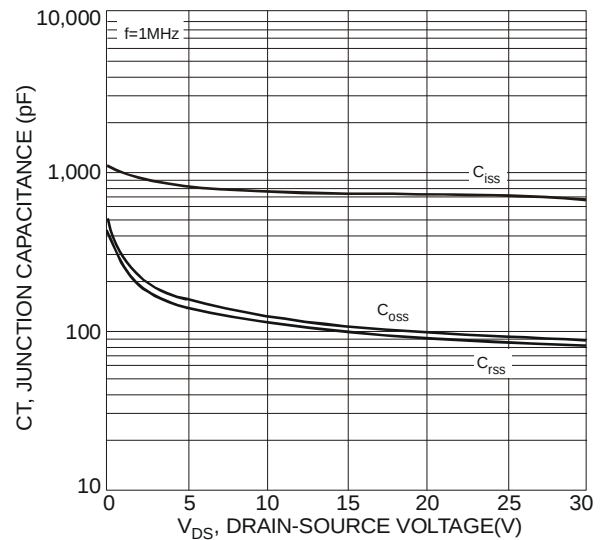


Fig. 10 Typical Junction Capacitance

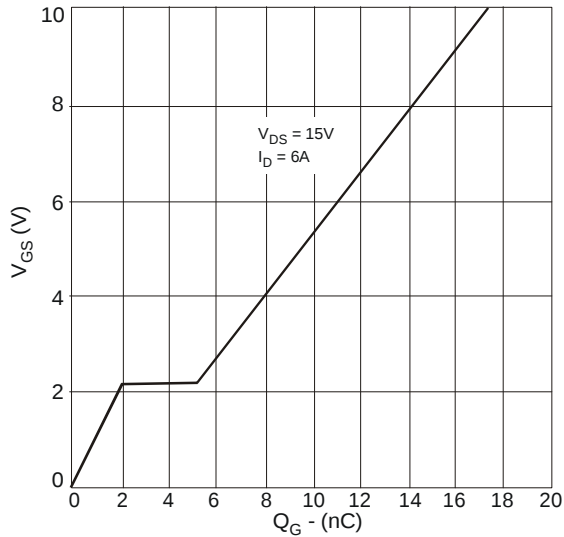


Fig. 11 Gate Charge Characteristics

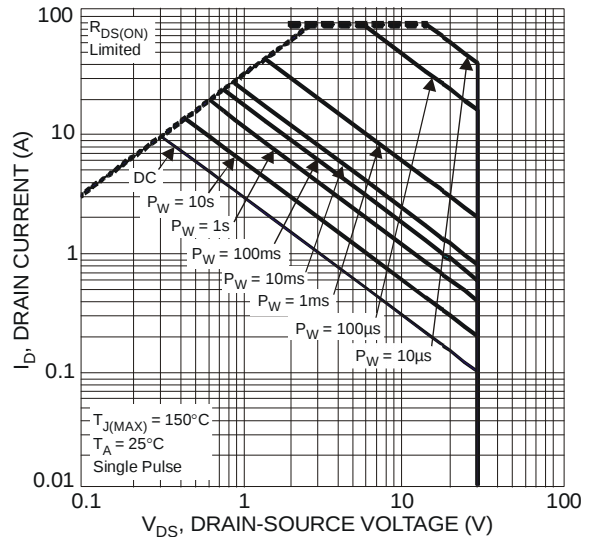
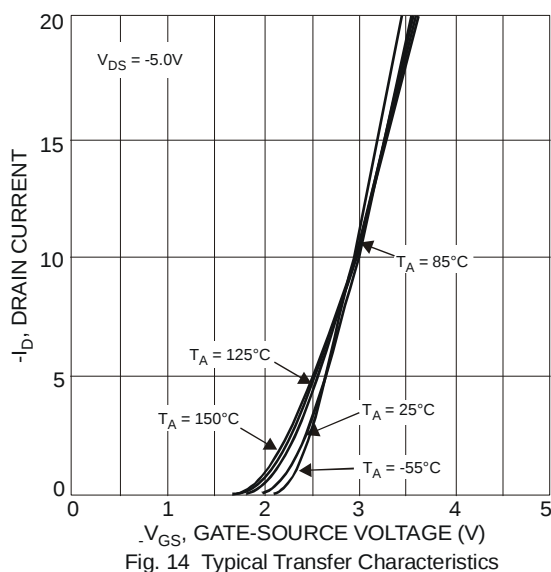
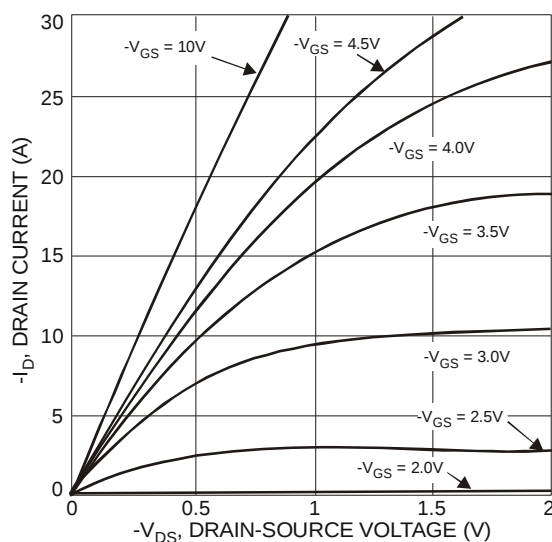


Fig. 12 SOA, Safe Operation Area

Electrical Characteristics P-CHANNEL – Q2 @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
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 9)						
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 10)						
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: 9. Short duration pulse test used to minimize self-heating effect
 10. Guaranteed by design. Not subject to product testing.



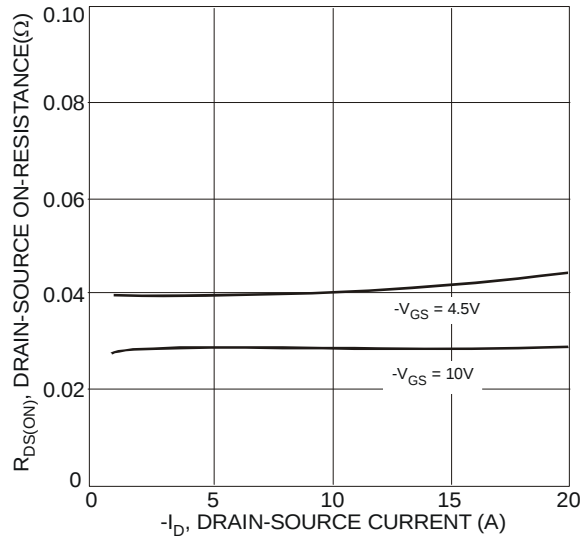


Fig. 15 Typical On-Resistance vs. Drain Current and Gate Voltage

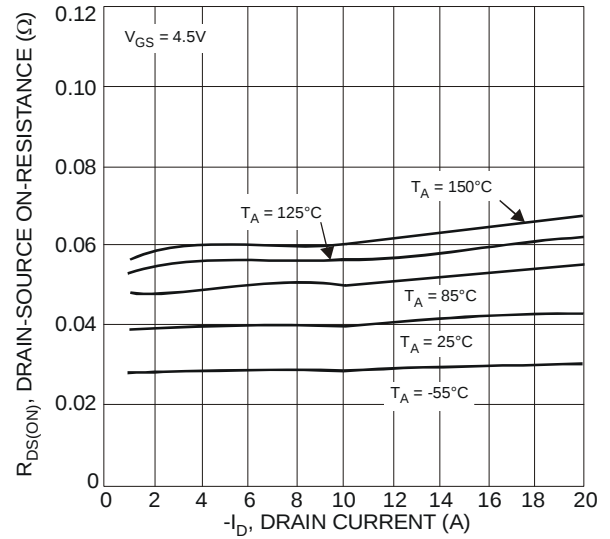


Fig. 16 Typical On-Resistance vs. Drain Current and Temperature

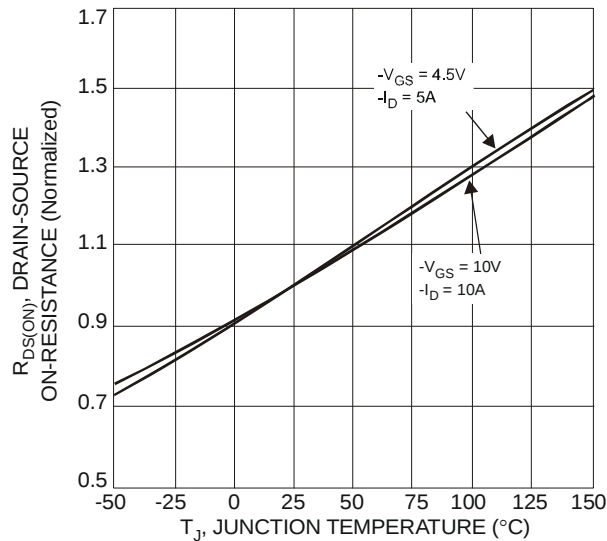


Fig. 17 On-Resistance Variation with Temperature

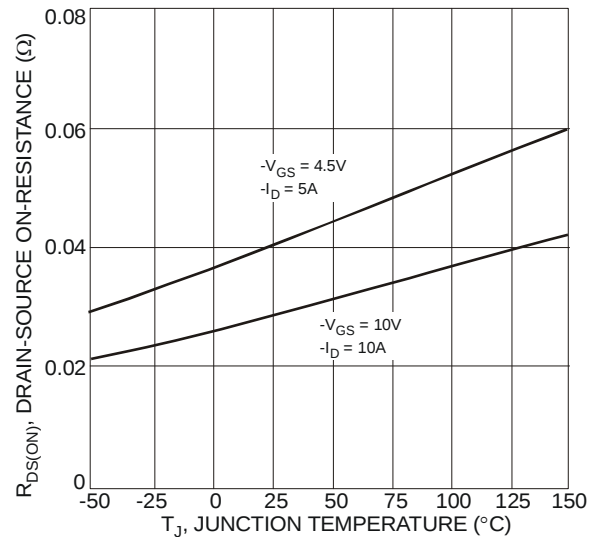


Fig. 18 On-Resistance Variation with Temperature

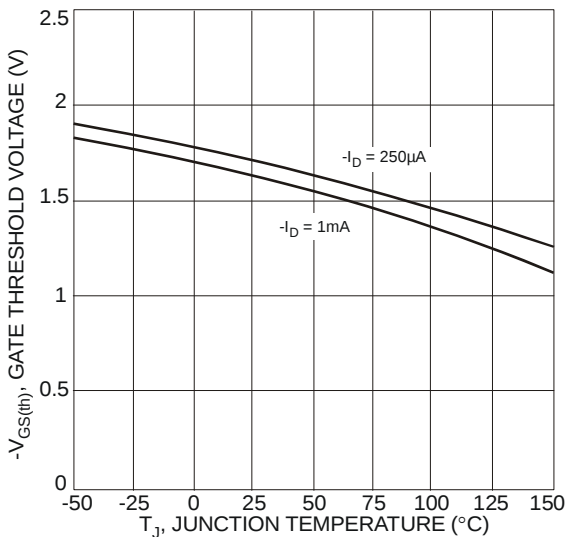


Fig. 19 On-Resistance Variation with Temperature

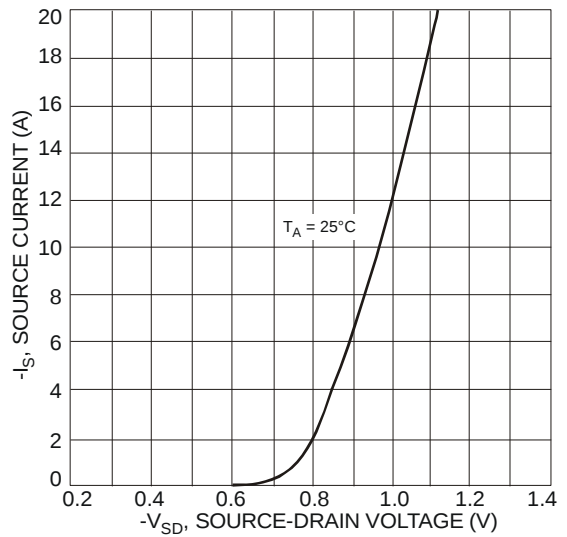


Fig. 20 Diode Forward Voltage vs. Current

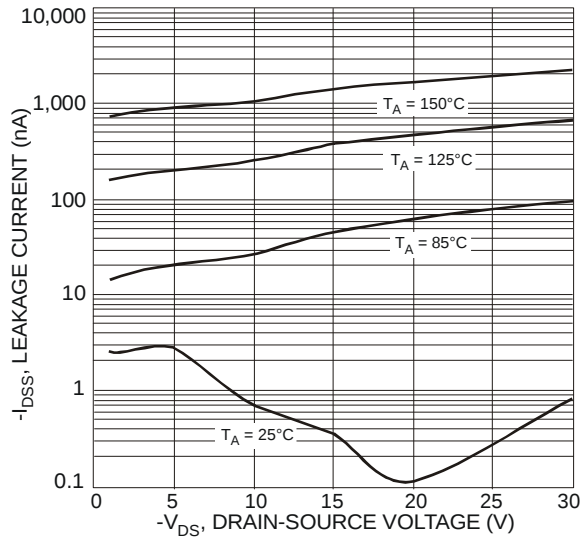


Fig. 21 Typical Drain-Source Leakage Current vs. Voltage

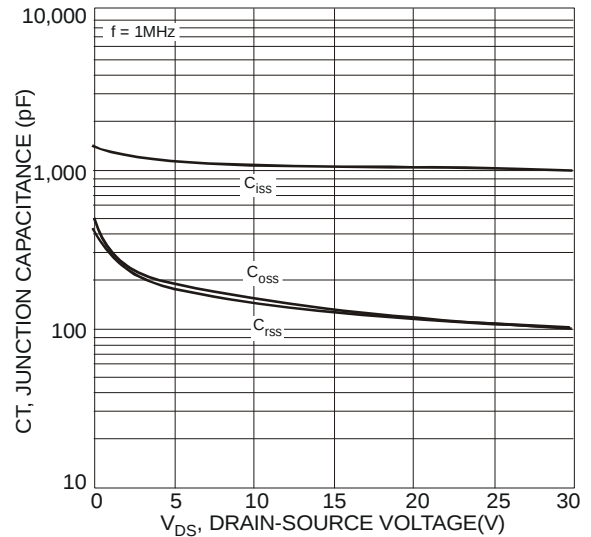


Fig. 22 Typical Junction Capacitance

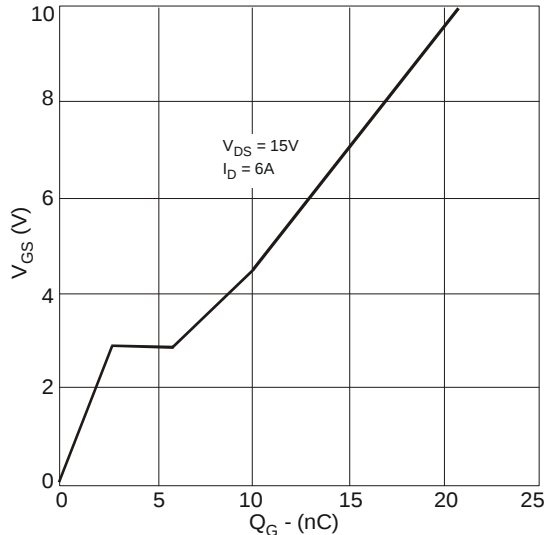


Fig. 23 Gate Charge Characteristics

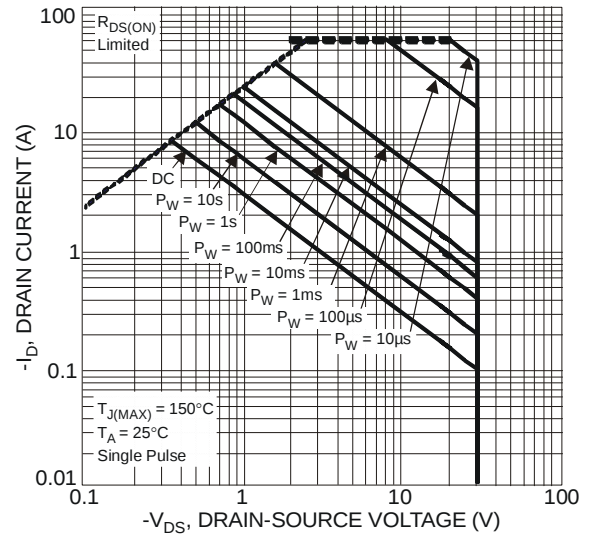


Fig. 24 SOA, Safe Operation Area

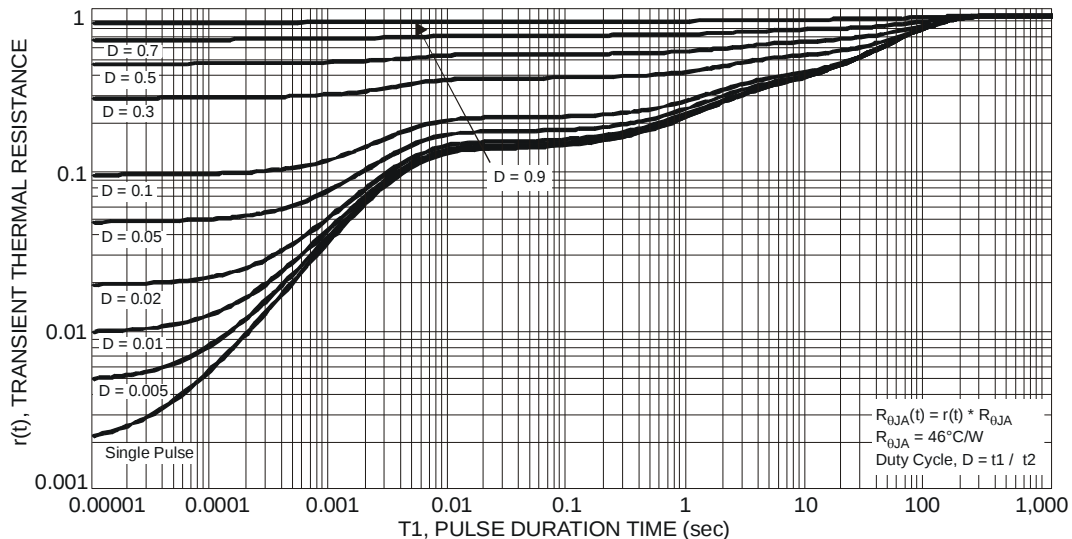
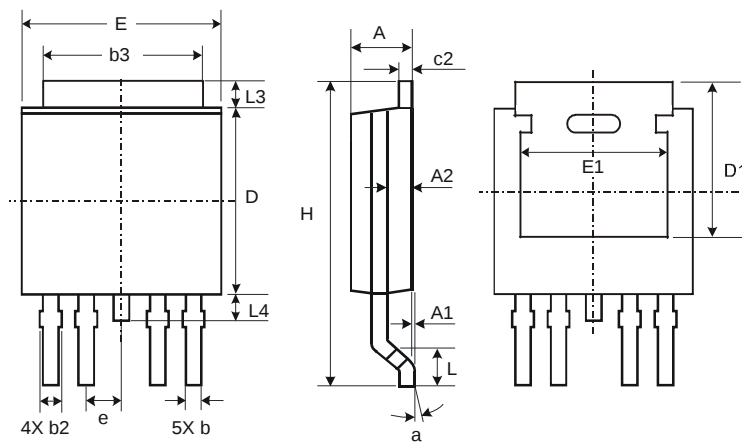


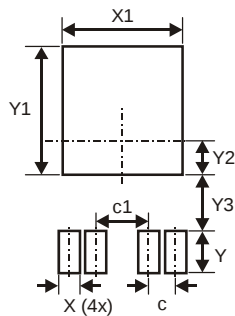
Fig. 25 Transient Thermal Resistance

Package Outline Dimensions



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



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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