

Dual Enhancement Mode MOSFET (N- and P-Channel)

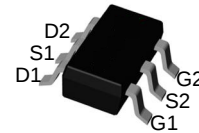
Features

- **N-Channel**
30V/4.9A,
 $R_{DS(ON)} = 49m\Omega(max.) @ V_{GS} = 10V$
 $R_{DS(ON)} = 68m\Omega(max.) @ V_{GS} = 4.5V$
- **P-Channel**
-30V/-3A,
 $R_{DS(ON)} = 100m\Omega(max.) @ V_{GS} = -10V$
 $R_{DS(ON)} = 150m\Omega(max.) @ V_{GS} = -4.5V$
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

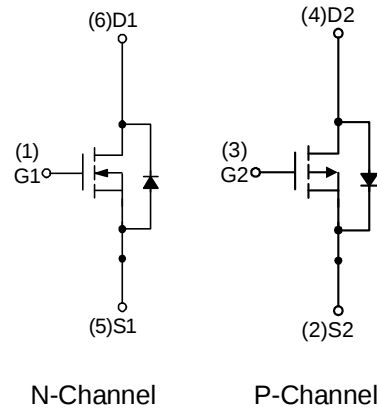
Applications

- Power Management in Notebook Computer, Portable Equipment and Battery Powered Systems.
- Load Switch

Pin Description



Top View of SOT-23-6



DMC2057UVT

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Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter		N Channel	P Channel	Unit
Common Ratings					
V _{DSS}	Drain-Source Voltage		30	-30	V
V _{GSS}	Gate-Source Voltage		±12	±12	V
I _D	Continuous Drain Current	T _A =25°C	4.9	-3	A
		T _A =70°C	3.9	-2.4	
I _{DM}	300μs Pulsed Drain Current	V _{GS} =10V	19	-12	
I _S	Diode Continuous Forward Current		1		°C
T _J	Maximum Junction Temperature		150		
T _{STG}	Storage Temperature Range		-55 to 150		
P _D	Maximum Power Dissipation	T _A =25°C	1.4		W
		T _A =70°C	0.9		
R _{θJA} *	Thermal Resistance-Junction to Ambient	t ≤ 10s	90		°C/W
		Steady State	125		

Note: * Surface Mounted on 1in^2 pad area.

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N Channel Electrical Characteristics (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	N Channel			Unit	
			Min.	Typ.	Max.		
Static Characteristics							
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	30	-	-	V	
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =24V, V _{GS} =0V T _J =85°C	-	-	1 30	μA	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	0.5	0.7	1.0	V	
I _{GSS}	Gate Leakage Current	V _{GS} =±12V, V _{DS} =0V	-	-	±100	nA	
R _{DS(ON)} ^a	Drain-Source On-State Resistance	V _{GS} =10V, I _{DS} =4.9A V _{GS} =4.5V, I _{DS} =3A	- -	39 58	49 68	mΩ	
Diode Characteristics							
V _{SD} ^a	Diode Forward Voltage	I _{SD} =1A, V _{GS} =0V	-	0.75	1.1	V	
t _{rr}	Reverse Recovery Time	I _{SD} =4.9A, dI _{SD} /dt=100A/μs	-	9.2	-	ns	
Q _{rr}	Reverse Recovery Charge		-	4.3	-	nC	
Dynamic Characteristics ^b							
R _g	Gate Resistance	V _{GS} =0V,V _{DS} =0V,F=1MHz	-	2.3	-	Ω	
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, Frequency=1.0MHz	-	215	-	pF	
C _{oss}	Output Capacitance		-	37	-		
C _{rss}	Reverse Transfer Capacitance		-	28	-		
t _{d(ON)}	Turn-on Delay Time	V _{DD} =15V, R _L =15Ω, I _{DS} =1A, V _{GEN} =10V, R _G =6Ω	-	5.3	8	ns	
T _r	Turn-on Rise Time		-	11	16		
t _{d(OFF)}	Turn-off Delay Time		-	12	17		
T _f	Turn-off Fall Time		-	2.6	4		
Gate Charge Characteristics ^b							
Q _g	Total Gate Charge	V _{DS} =15V, I _{DS} =4.9A	V _{GS} =4.5V, V _{GS} =10V	- -	3 5.8	- -	nC
Q _{gs}	Gate-Source Charge	V _{DS} =15V, V _{GS} =10V, I _{DS} =4.9A	-	1.1	-		
Q _{gd}	Gate-Drain Charge		-	1.5	-		
Q _{gth}	Threshold Gate Charge		-	0.5	-		

Note a: Pulse test; pulse width≤300μs, duty cycle≤2%.

Note b: Guaranteed by design, not subject to production testing.

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P Channel Electrical Characteristics (T_A = 25°C unless otherwise noted)

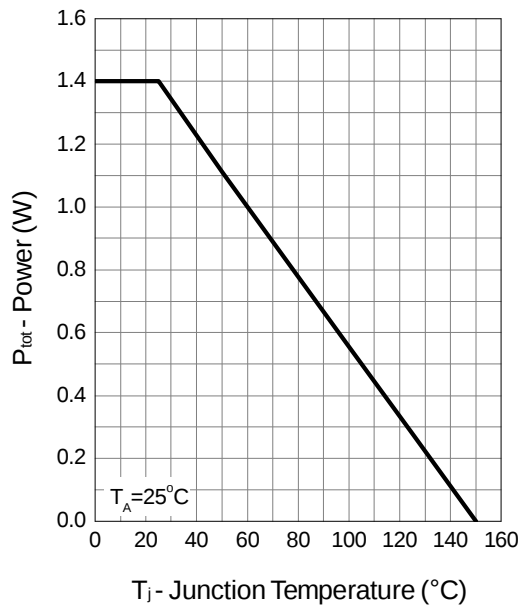
Symbol	Parameter	Test Conditions	P Channel			Unit	
			Min.	Typ.	Max.		
Static Characteristics							
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =-250μA	-30	-	-	V	
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-24V, V _{GS} =0V T _J =85°C	-	-	-1	μA	
			-	-	-30		
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =-250μA	-0.5	-0.7	-1.0	V	
I _{GSS}	Gate Leakage Current	V _{GS} =±12V, V _{DS} =0V	-	-	±100	nA	
R _{DS(ON)} ^a	Drain-Source On-State Resistance	V _{GS} =-10V, I _{DS} =-3A V _{GS} =-4.5V, I _{DS} =-1.9A	-	82	100	mΩ	
			-	102	150		
Diode Characteristics							
V _{SD} ^a	Diode Forward Voltage	I _{SD} =-1A, V _{GS} =0V	-	-0.75	-1.1	V	
t _{rr}	Reverse Recovery Time	I _{SD} =-3A, dI _{SD} /dt=100A/μs	-	19	-	ns	
Q _{rr}	Reverse Recovery Charge		-	14	-	nC	
Dynamic Characteristics ^b							
R _g	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz	-	7	-	Ω	
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-15V, Frequency=1.0MHz	-	229	-	pF	
C _{oss}	Output Capacitance		-	42	-		
C _{rss}	Reverse Transfer Capacitance		-	33	-		
t _{d(ON)}	Turn-on Delay Time	V _{DD} =-15V, R _L =15Ω, I _{DS} =-1A, V _{GEN} =-10V, R _G =6Ω	-	7.2	-	ns	
T _r	Turn-on Rise Time		-	9.3	-		
t _{d(OFF)}	Turn-off Delay Time		-	15.4	-		
T _f	Turn-off Fall Time		-	3.6	-		
Gate Charge Characteristics ^b							
Q _g	Total Gate Charge	V _{DS} =-15V, I _{DS} =-3A	V _{GS} =-4.5V, V _{GS} =-10V	-	3.3	-	nC
				-	6.5	-	
Q _{gs}	Gate-Source Charge	V _{DS} =-15V, V _{GS} =-10V, I _{DS} =-3A	-	1.1	-		
Q _{gd}	Gate-Drain Charge		-	1.1	-		
Q _{gth}	Threshold Gate Charge		-	0.6	-		

Note a: Pulse test; pulse width≤300μs, duty cycle≤2%.

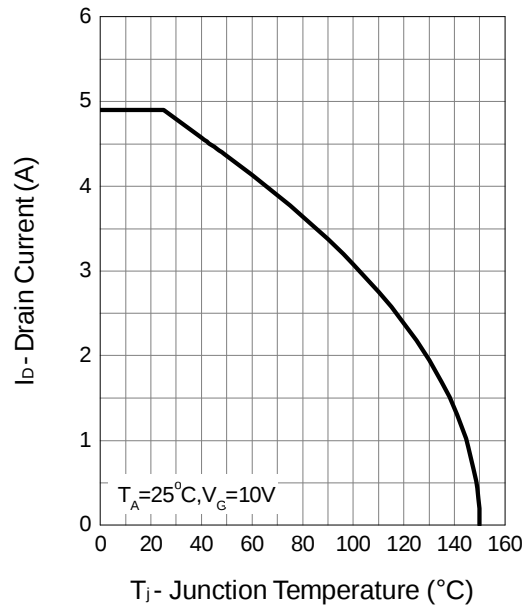
Note b: Guaranteed by design, not subject to production testing.

N Channel Typical Operating Characteristics

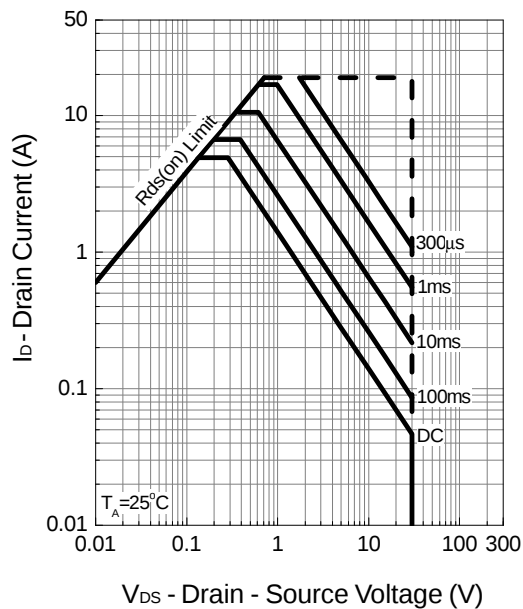
Power Dissipation



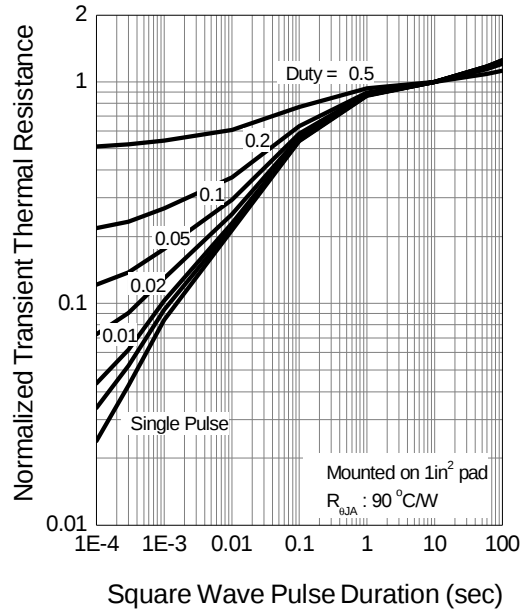
Drain Current



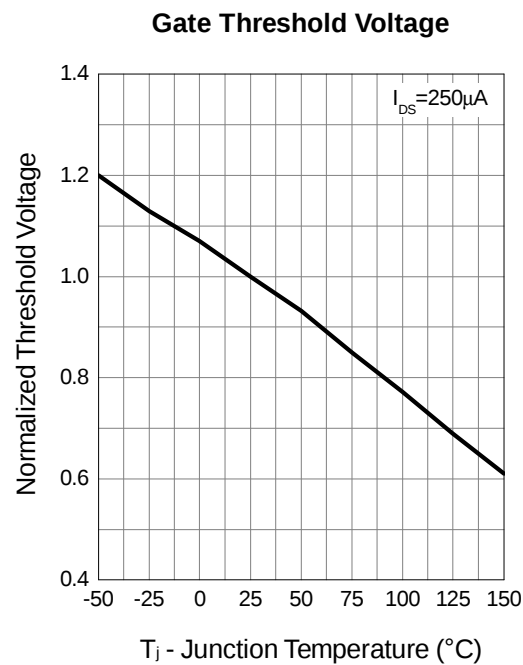
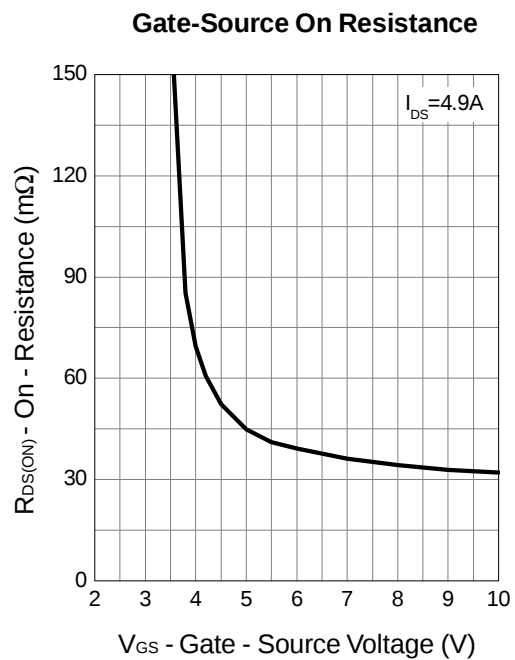
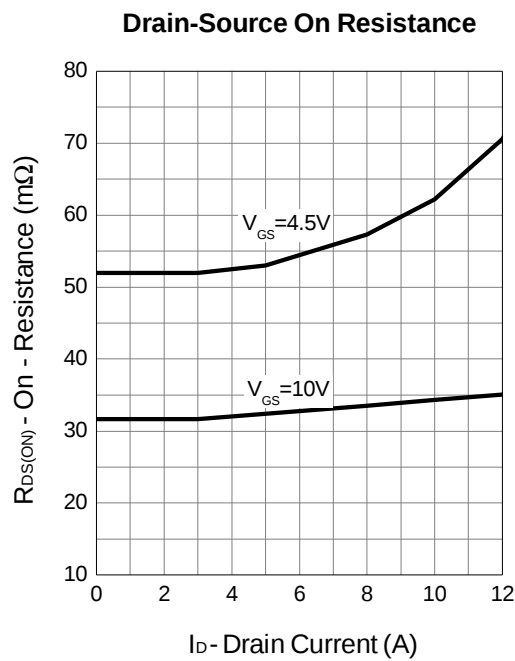
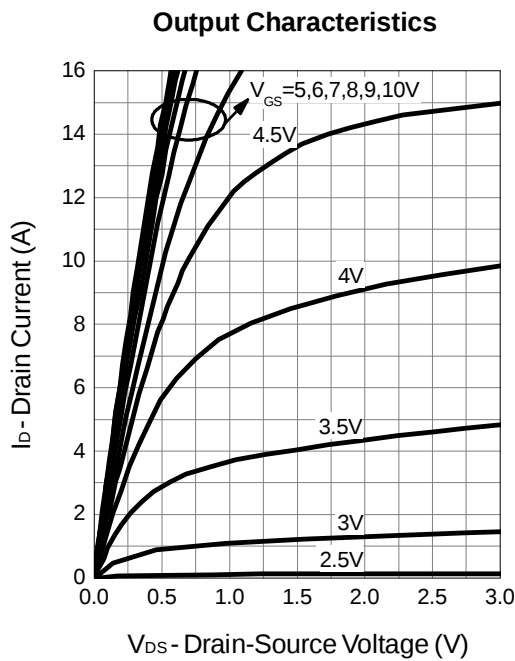
Safe Operation Area



Thermal Transient Impedance

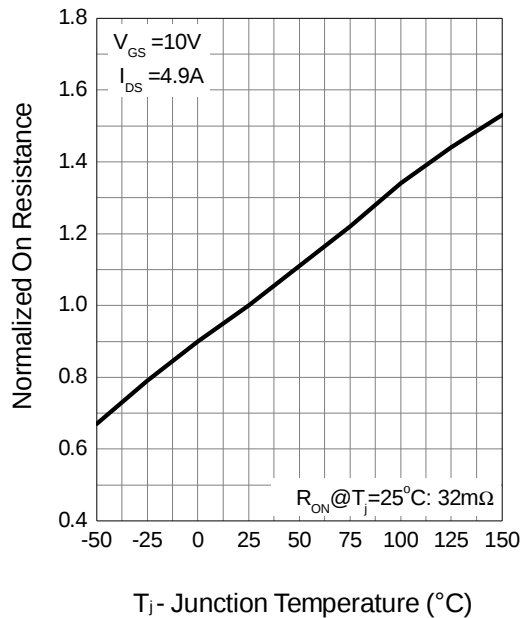


N Channel Typical Operating Characteristics (Cont.)

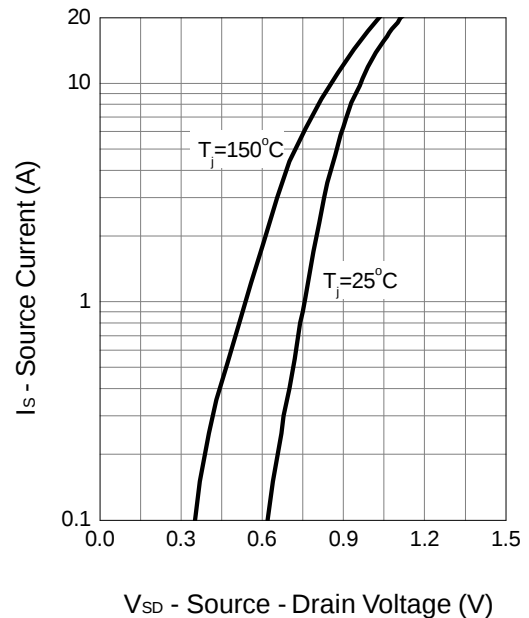


N Channel Typical Operating Characteristics (Cont.)

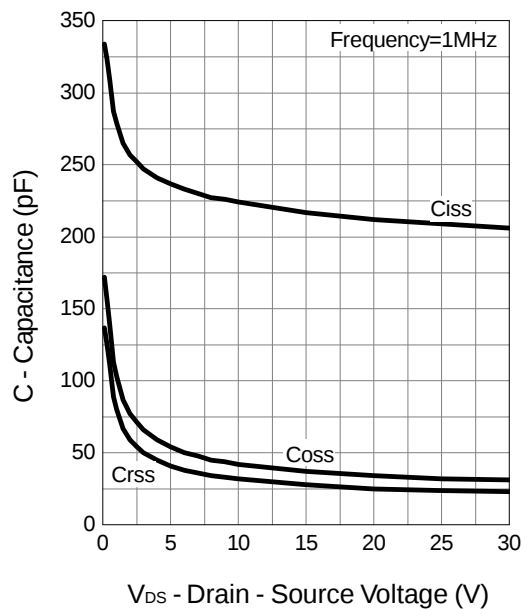
Drain-Source On Resistance



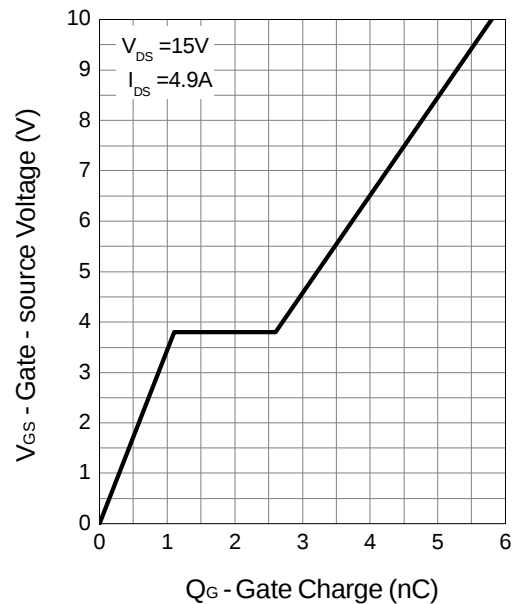
Source-Drain Diode Forward



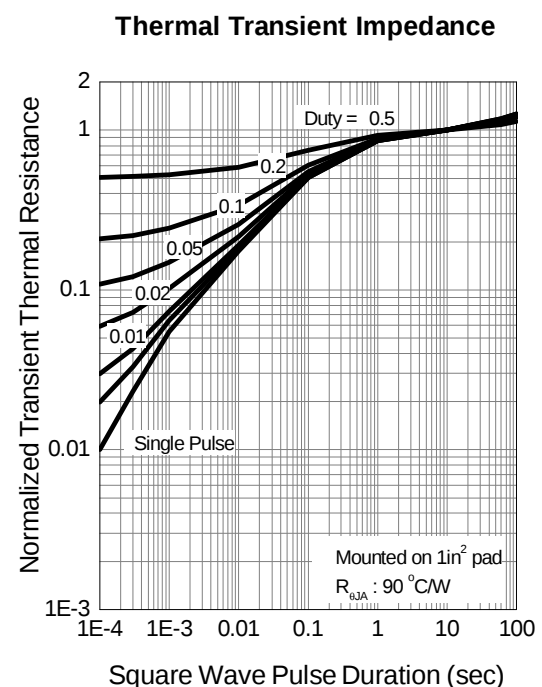
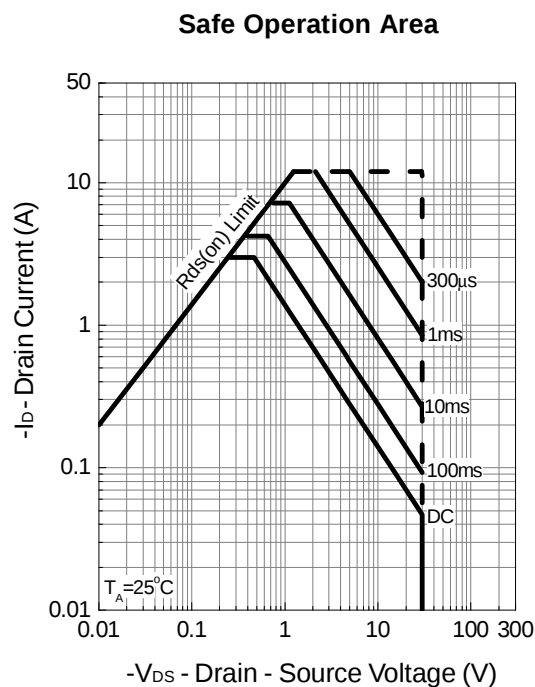
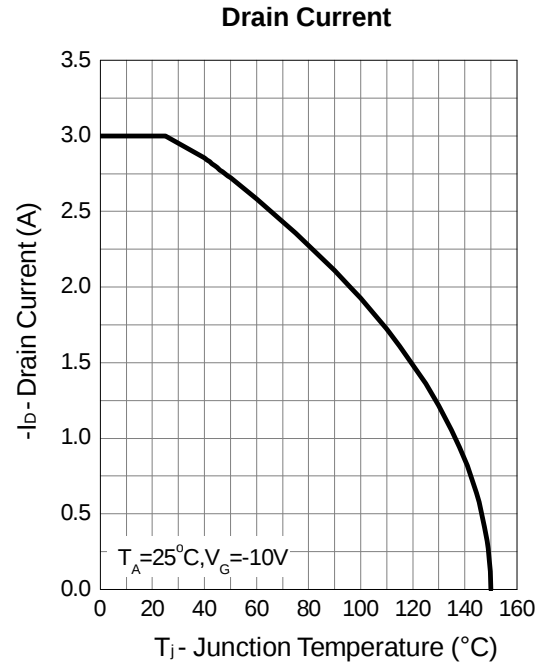
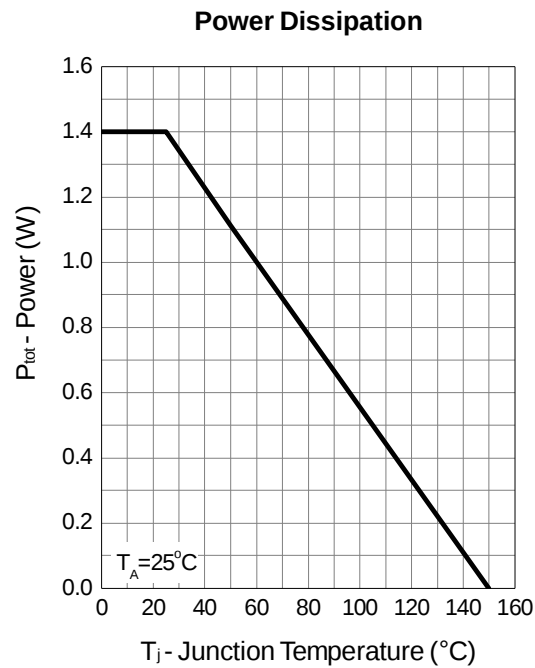
Capacitance



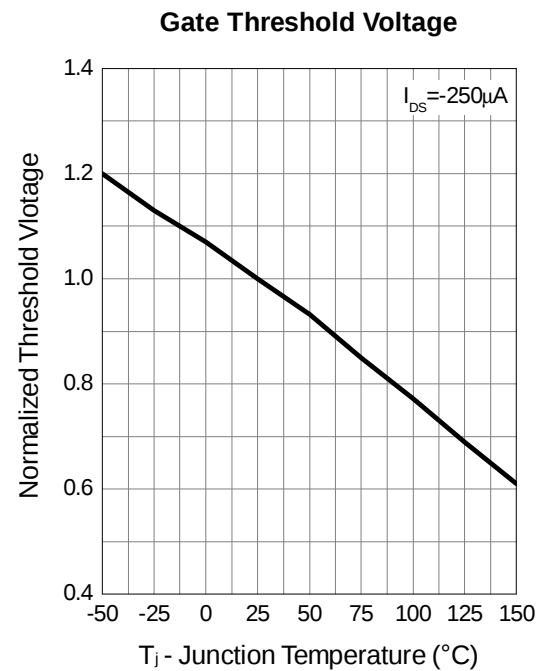
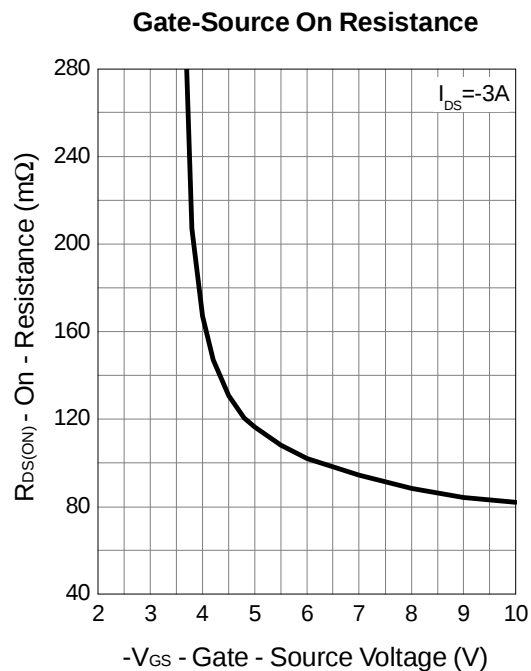
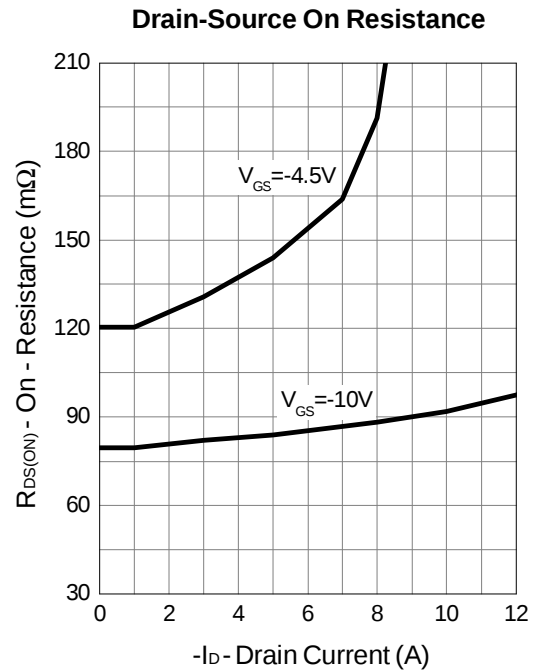
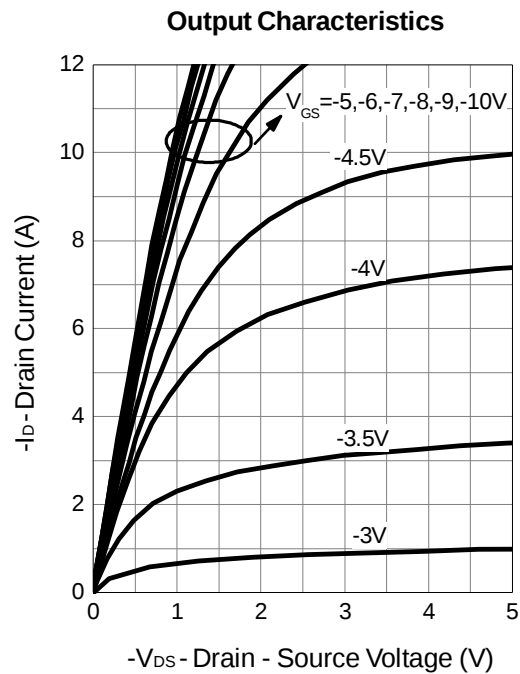
Gate Charge



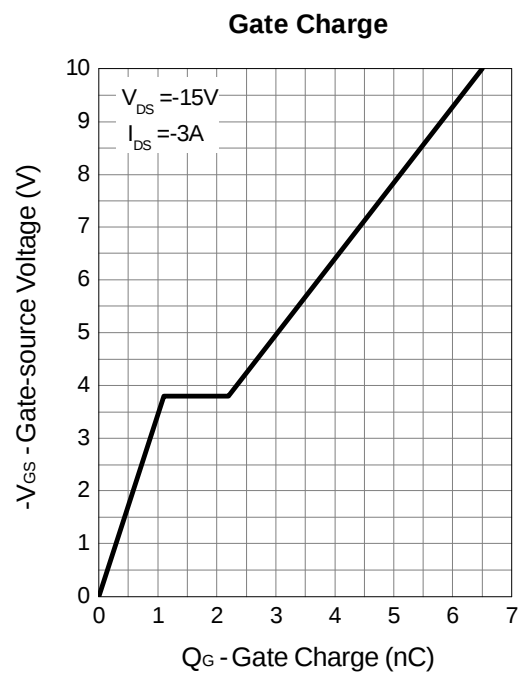
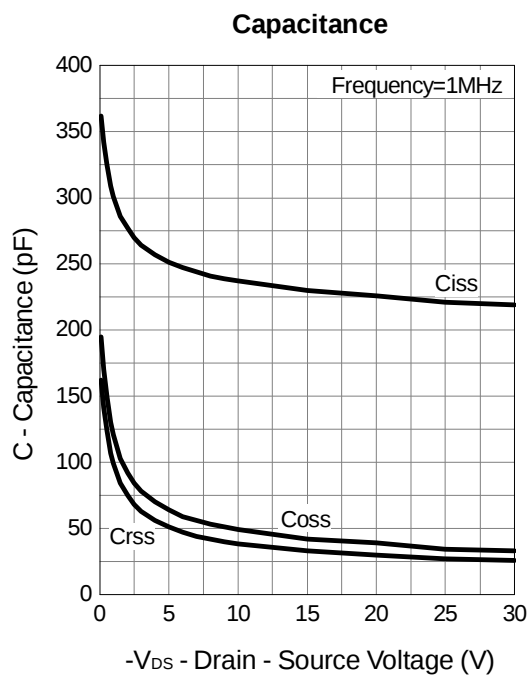
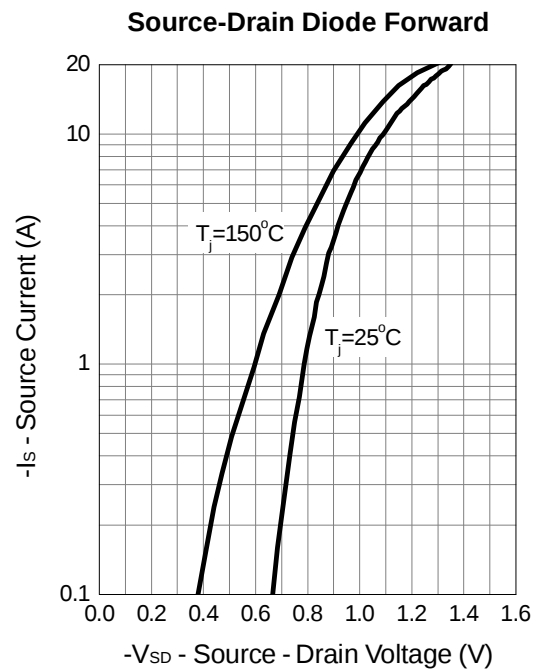
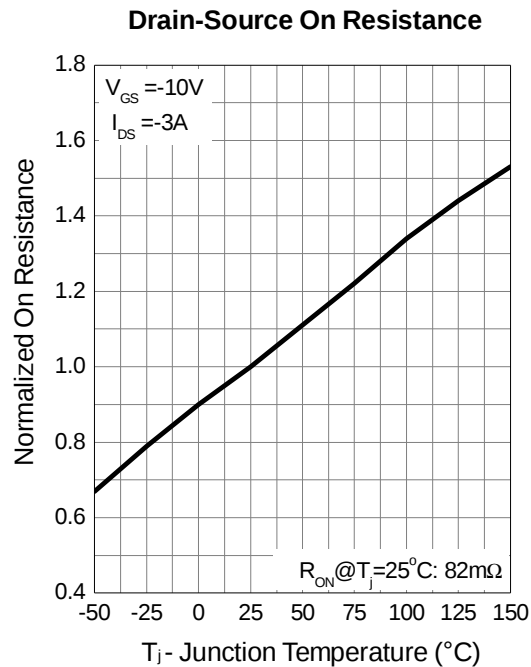
P Channel Typical Operating Characteristics



P Channel Typical Operating Characteristics (Cont.)

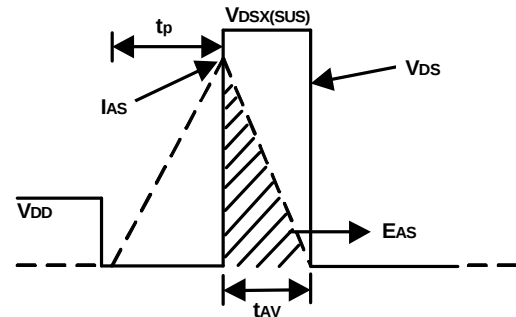
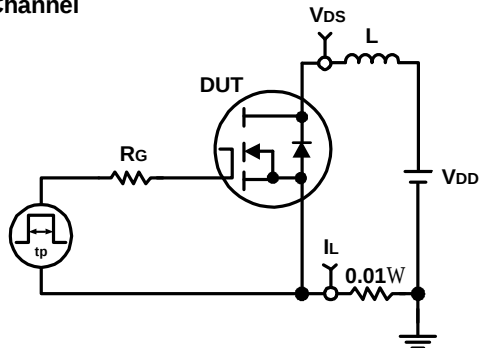


P Channel Typical Operating Characteristics (Cont.)

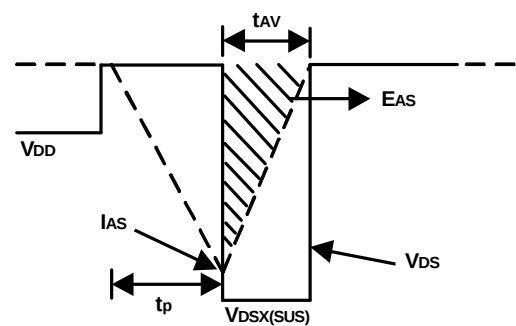
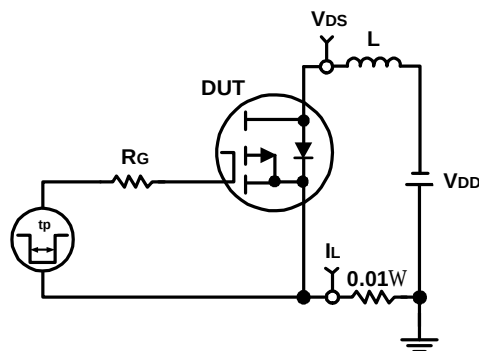


Avalanche Test Circuit and Waveforms

N Channel

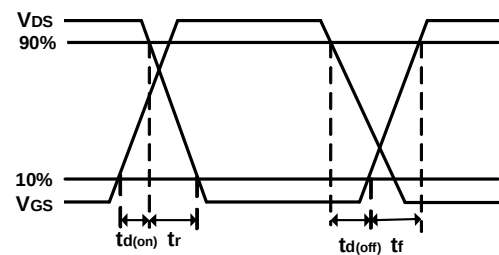
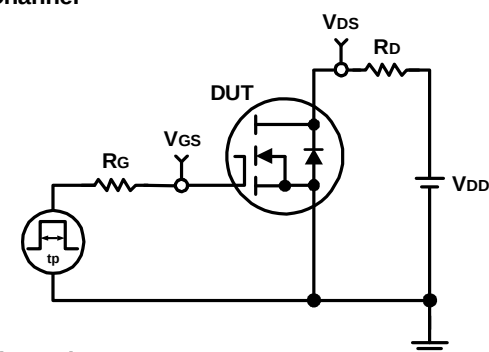


P Channel

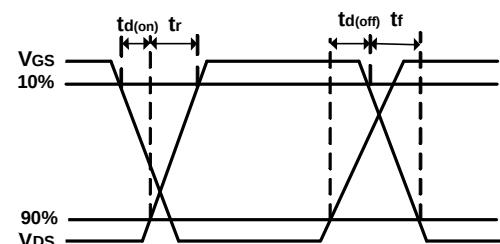
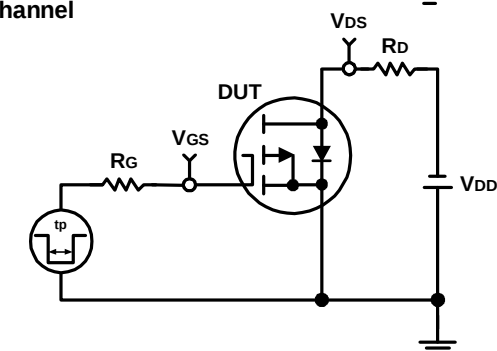


Switching Time Test Circuit and Waveforms

N Channel



P Channel

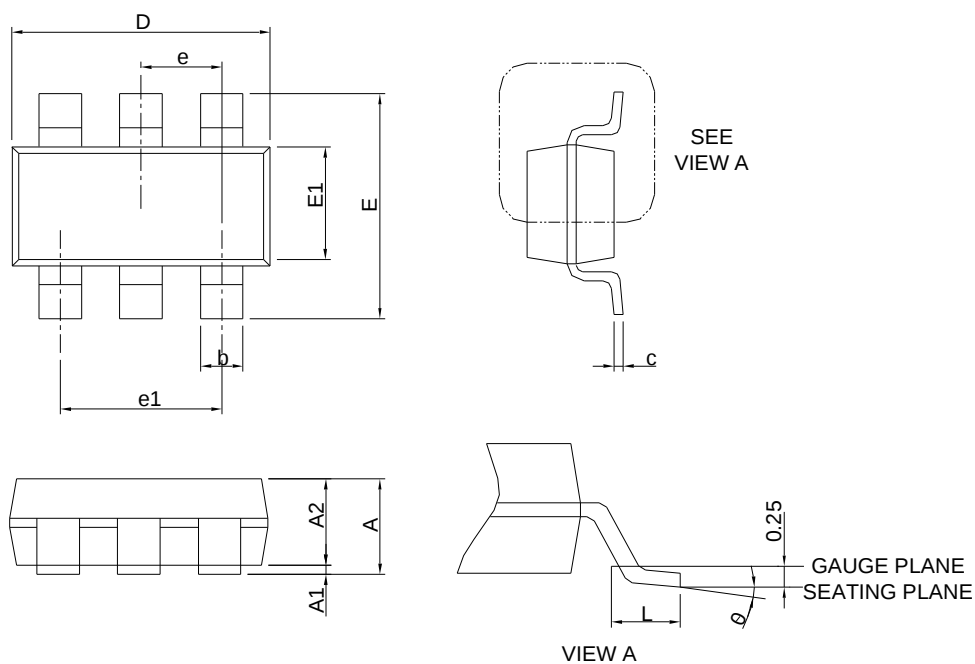


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Package Information

SOT-23-6

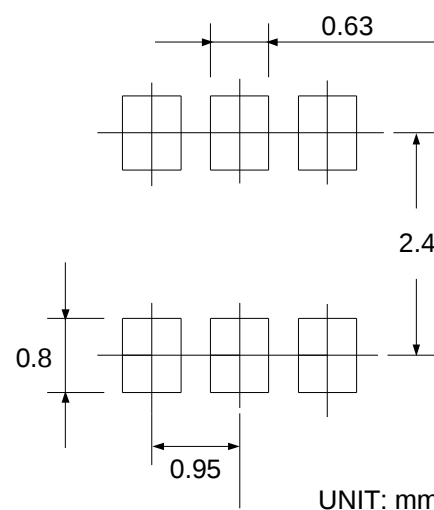


SYMBOL	SOT-23-6			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	-	1.25	-	0.049
A1	0.00	0.05	0.000	0.002
A2	0.90	1.20	0.035	0.047
b	0.30	0.50	0.012	0.020
c	0.08	0.22	0.003	0.009
D	2.70	3.10	0.106	0.122
E	2.60	3.00	0.102	0.118
E1	1.40	1.80	0.055	0.071
e	0.95 BSC		0.037 BSC	
e1	1.90 BSC		0.075 BSC	
L	0.30	0.60	0.012	0.024
θ	0°	8°	0°	8°

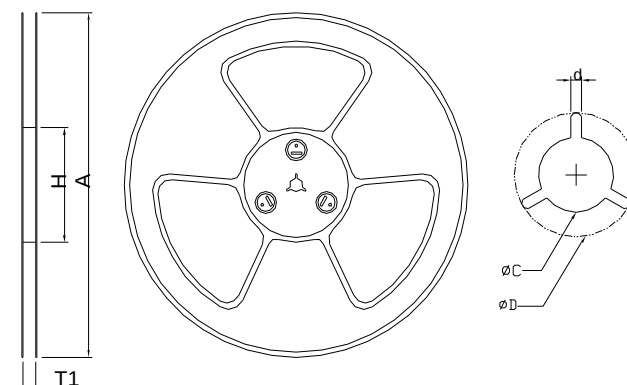
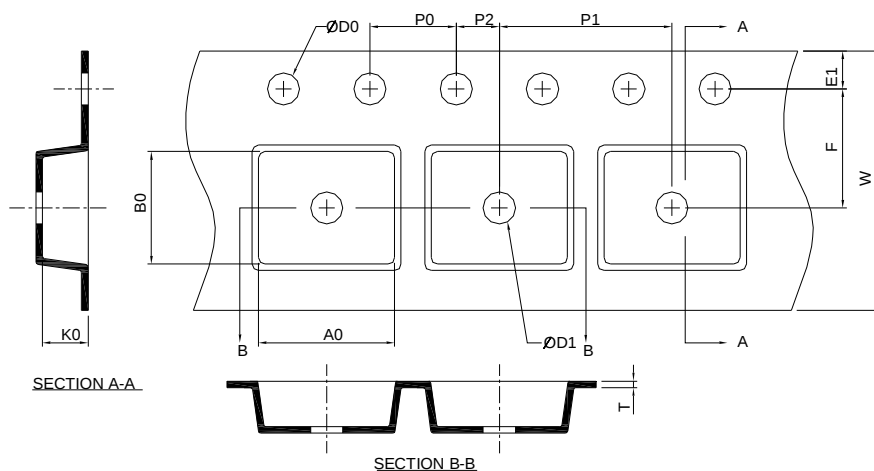
Note : 1. Follow JEDEC TO-178 AB.

2. Dimension D and E1 do not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 10 mil per side.

RECOMMENDED LAND PATTERN



Carrier Tape & Reel Dimensions



Application	A	H	T1	C	d	D	W	E1	F
SOT-23-6	178.0±2.00	50 MIN.	8.4+2.00 -0.00	13.0+0.50 -0.20	1.5 MIN.	20.2 MIN.	8.0±0.30	1.75±0.10	3.5±0.05
	P0	P1	P2	D0	D1	T	A0	B0	K0
	4.0±0.10	4.0±0.10	2.0±0.05	1.5+0.10 -0.00	1.0 MIN.	0.6+0.00 -0.40	3.20±0.20	3.10±0.20	1.50±0.20

(mm)