

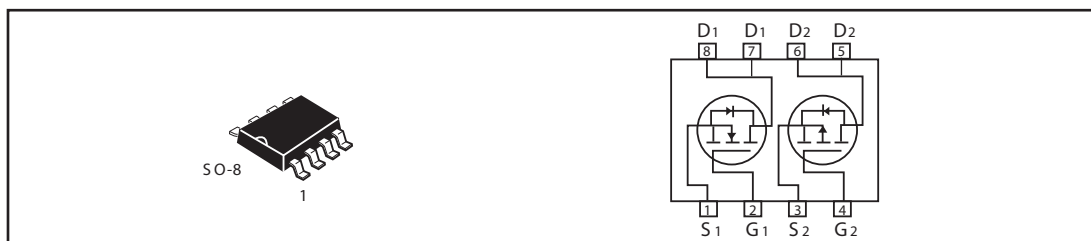


# SDM8401

## Dual Enhancement Mode Field Effect Transistor ( N and P Channel)

PRODUCT SUMMARY (N-Channel)		
V <sub>DSS</sub>	I <sub>D</sub>	R <sub>DS(ON)</sub> ( mΩ ) TYP
30V	6A	18.5 @ V <sub>GS</sub> = 10V
		25 @ V <sub>GS</sub> = 4.5V

PRODUCT SUMMARY (P-Channel)		
V <sub>DSS</sub>	I <sub>D</sub>	R <sub>DS(ON)</sub> ( mΩ ) TYP
-30V	-4.5A	38.5 @ V <sub>GS</sub> = -10V
		57.5 @ V <sub>GS</sub> = -4.5V



### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub>=25°C unless otherwise noted)

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V <sub>DS</sub>	30	-30	V
Gate-Source Voltage	V <sub>GS</sub>	±20	±20	V
Drain Current-Continuous <sup>a</sup> @ T <sub>J</sub> =125°C -Pulsed <sup>b</sup>	I <sub>D</sub>	±6.0	±4.5	A
	I <sub>DM</sub>	±18.0	±15	A
Drain-Source Diode Forward Current <sup>a</sup>	I <sub>S</sub>	1.7	-1.7	A
Maximum Power Dissipation <sup>a</sup>	P <sub>D</sub>	2.0		W
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to 150		°C

### THERMAL CHARACTERISTICS

Thermal Resistance, Junction-to-Ambient <sup>a</sup>	R <sub>θJA</sub>	62.5	°C/W
--	------------------	------	------

# S DM8401

N-Channel ELECTRICAL CHARACTERISTICS (TA = 25 °C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ <sup>c</sup>	Max	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250uA	30			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V			1	uA
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>GS</sub> = ±16V, V <sub>DS</sub> = 0V			±100	nA
<b>ON CHARACTERISTICS<sup>b</sup></b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250uA	1	1.5	3	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 9A		18.5	21	m ohm
		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 7A		25	32	m ohm
On-State Drain Current	I <sub>D(ON)</sub>	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 10V	40			A
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = 10V, I <sub>D</sub> = 20A		16		S
<b>DYNAMIC CHARACTERISTICS<sup>c</sup></b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V f = 1.0MHz		950		pF
Output Capacitance	C <sub>OSS</sub>			420		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			110		pF
<b>SWITCHING CHARACTERISTICS<sup>c</sup></b>						
Turn-On Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> = 15V, I <sub>D</sub> = 1A, V <sub>GS</sub> = 10V, R <sub>GEN</sub> = 6		7		ns
Rise Time	t <sub>r</sub>			30		ns
Turn-Off Delay Time	t <sub>D(OFF)</sub>			14		ns
Fall Time	t <sub>f</sub>			54		ns
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 15V, I <sub>D</sub> = 9A, V <sub>GS</sub> = 10V		25.2	35	nC
		V <sub>DS</sub> = 15V, I <sub>D</sub> = 9A, V <sub>GS</sub> = 4.5V		12.1	14.6	nC
Gate-Source Charge	Q <sub>gs</sub>	V <sub>DS</sub> = 15V, I <sub>D</sub> = 9A, V <sub>GS</sub> = 10V		5.12		nC
Gate-Drain Charge	Q <sub>gd</sub>			4.8		nC

# S DM8401

P-Channel ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25 °C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ <sup>c</sup>	Max	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA	-30			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V			-1	μA
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V			±100	nA
<b>ON CHARACTERISTICS<sup>b</sup></b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250uA	-1	-1.5	-3	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-4.5A		38.5	53	m ohm
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-3.6A		57.5	95	m ohm
On-State Drain Current	I <sub>D(ON)</sub>	V <sub>DS</sub> =-5V, V <sub>GS</sub> =-10V	-20			A
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =-15V, I <sub>D</sub> =-4.5A	5	10		S
<b>DYNAMIC CHARACTERISTICS<sup>c</sup></b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V f=1.0MHz		860		pF
Output Capacitance	C <sub>OSS</sub>			457		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			140		pF
<b>SWITCHING CHARACTERISTICS<sup>c</sup></b>						
Turn-On Delay Time	t <sub>D(ON)</sub>	V <sub>D</sub> =-15V, R <sub>L</sub> =15 I <sub>D</sub> =-1A, V <sub>GEN</sub> =-10V, R <sub>GEN</sub> =6		9	20	ns
Rise Time	t <sub>r</sub>			10	40	ns
Turn-Off Delay Time	t <sub>D(OFF)</sub>			37	90	ns
Fall Time	t <sub>f</sub>			23	110	ns
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-15V, I <sub>D</sub> =-4.9A, V <sub>GS</sub> =-10V		15	20	nC
		V <sub>DS</sub> =-15V, I <sub>D</sub> =-4.9A, V <sub>GS</sub> =-4.5V		8	10	nC
Gate-Source Charge	Q <sub>gs</sub>	V <sub>DS</sub> =-15V, I <sub>D</sub> =-4.9A, V <sub>GS</sub> =-10V		3		nC
Gate-Drain Charge	Q <sub>gd</sub>			4		nC

# S DM8401

## ELECTRICAL CHARACTERISTICS ( $T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ <sup>c</sup>	Max	Unit	
DRAIN-SOURCE DIODE CHARACTERISTICS <sup>b</sup>							
Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0\text{V}, I_S = 1.7\text{A}$	N-Ch		0.77	1.2	V
		$V_{GS} = 0\text{V}, I_S = -1.7\text{A}$	P-Ch		-0.80	-1.2	

### Notes

- a. Surface Mounted on FR4 Board,  $t \leq 10\text{sec}$ .
  - b. Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .
  - c. Guaranteed by design, not subject to production testing.
- N-Channel

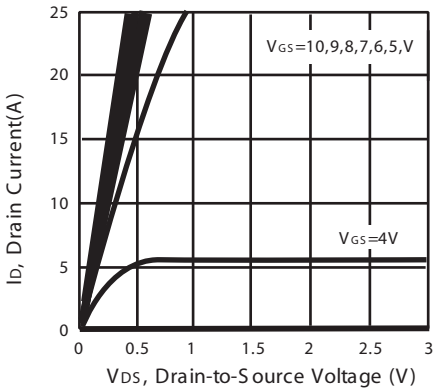


Figure 1. Output Characteristics

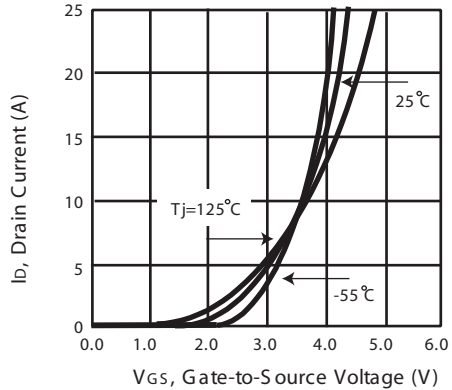


Figure 2. Transfer Characteristics

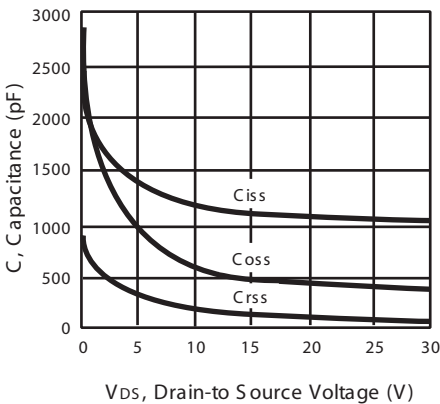


Figure 3. Capacitance

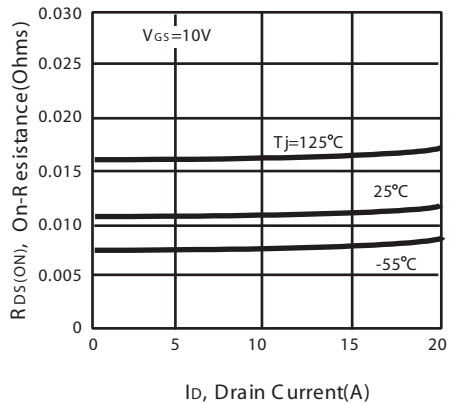
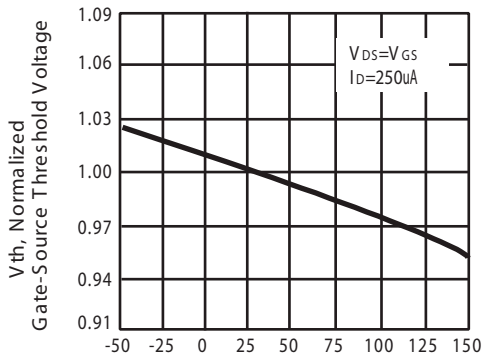


Figure 4. On-Resistance Variation with Drain Current and Temperature

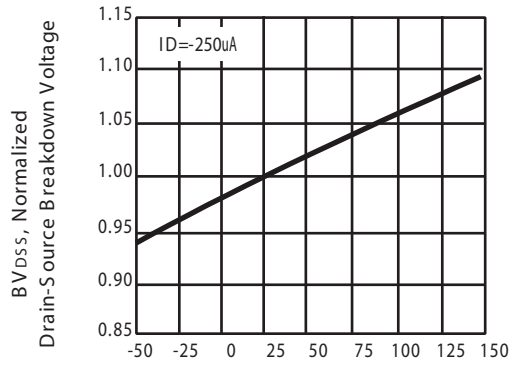
# S DM8401

## N-Channel



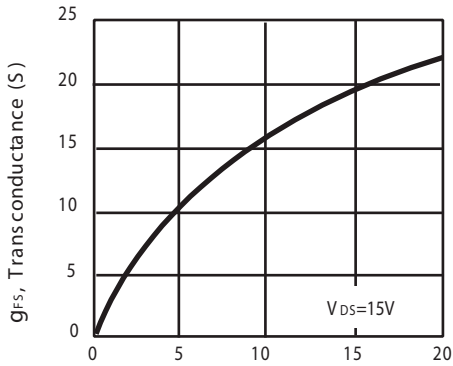
Tj, Junction Temperature (°C)

Figure 5. Gate Threshold Variation with Temperature



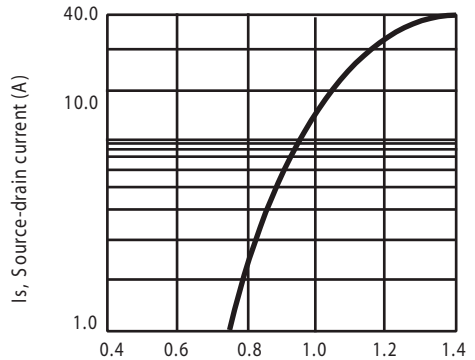
Tj, Junction Temperature (°C)

Figure 6. Breakdown Voltage Variation with Temperature



Ids, Drain-Source Current (A)

with Drain Current



Vsd, Body Diode Forward Voltage (V)

Figure 8. Body Diode Forward Voltage Variation with Source Current

# S DM8401

## P-Channel

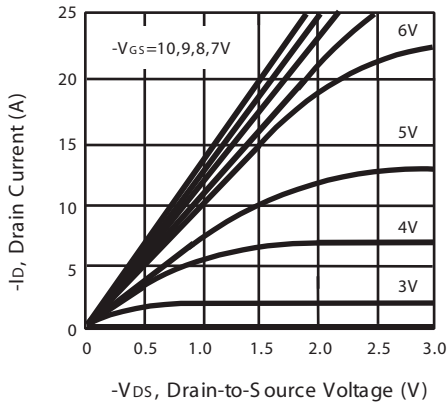


Figure 1. Output Characteristics

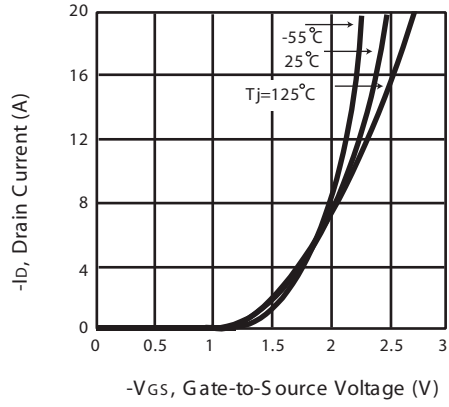


Figure 2. Transfer Characteristics

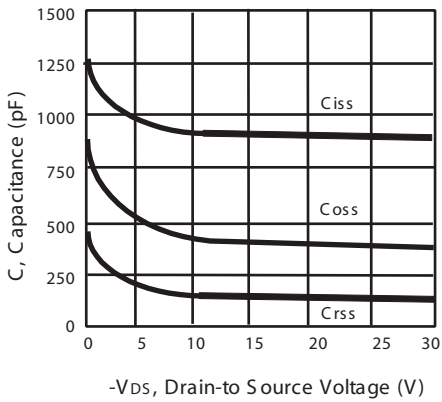


Figure 3. Capacitance

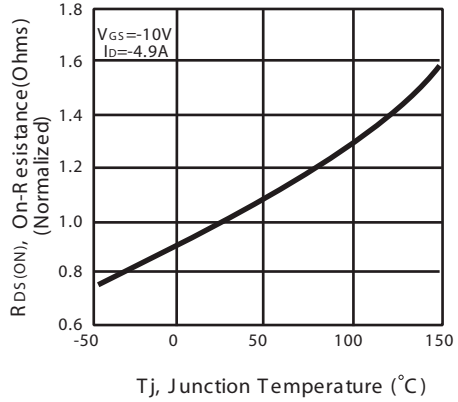


Figure 4. On-Resistance Variation with Temperature

# S DM8401

## P-Channel

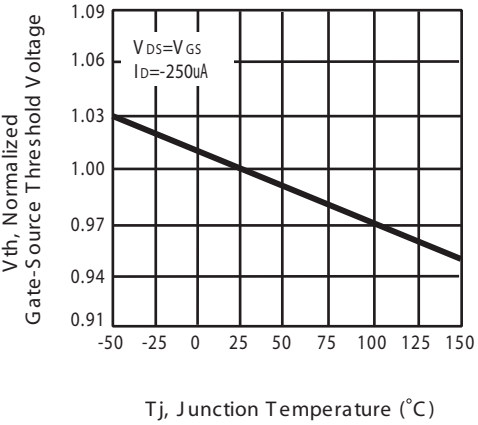


Figure 5. Gate Threshold Variation with Temperature

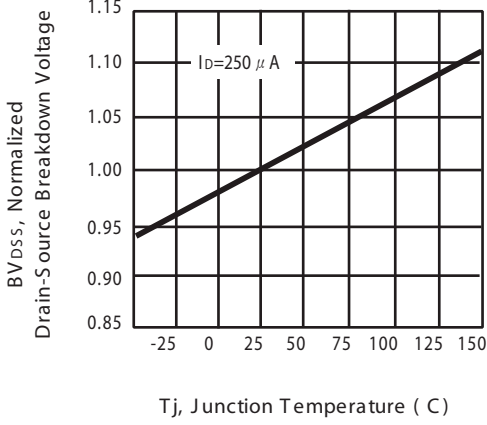


Figure 6. Breakdown Voltage Variation with Temperature

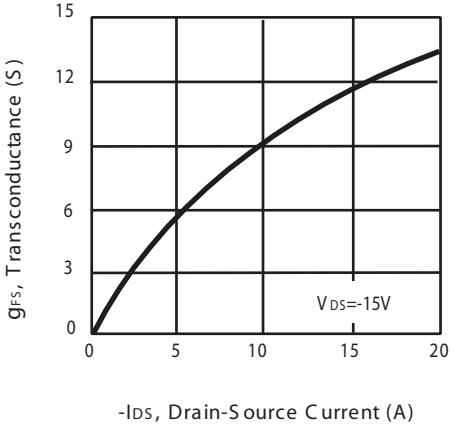


Figure 7. Transconductance Variation with Drain Current

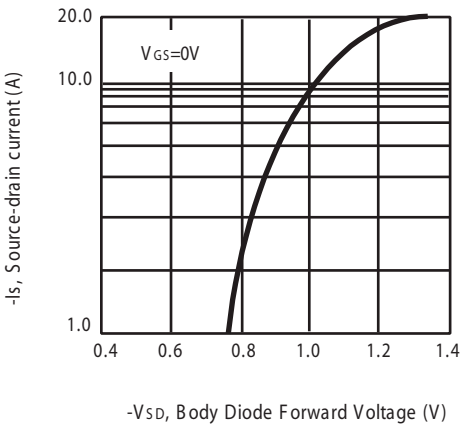
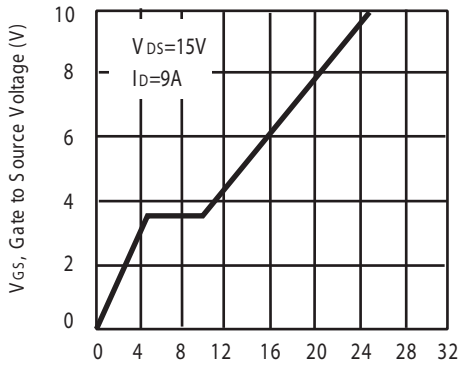


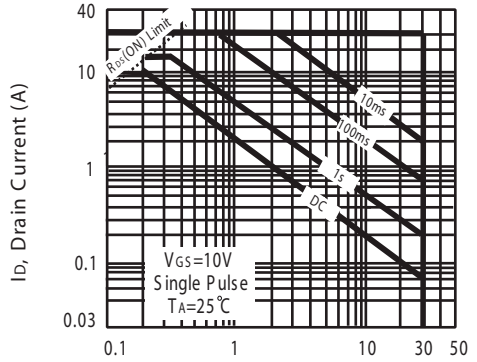
Figure 8. Body Diode Forward Voltage Variation with Source Current

# S DM8401

## N-Channel

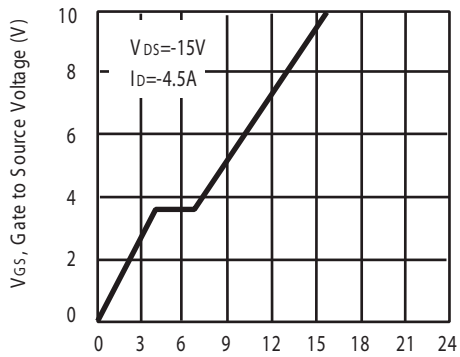


Qg, Total Gate Charge (nC)  
Figure 9. Gate Charge

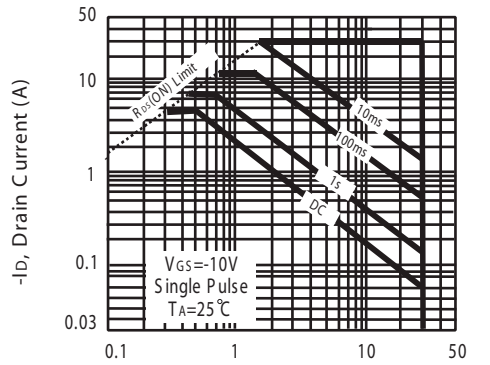


Vds, Drain-Source Voltage (V)  
Figure 10. Maximum Safe Operating Area

## P-Channel



Qg, Total Gate Charge (nC)  
Figure 9. Gate Charge



$-V_{DS}$ , Body Diode Forward Voltage (V)  
Figure 10. Maximum Safe Operating Area



# S DM8401

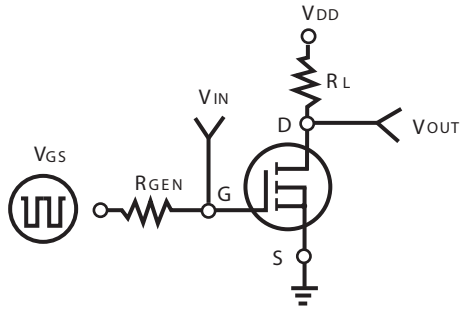


Figure 11. Switching Test Circuit

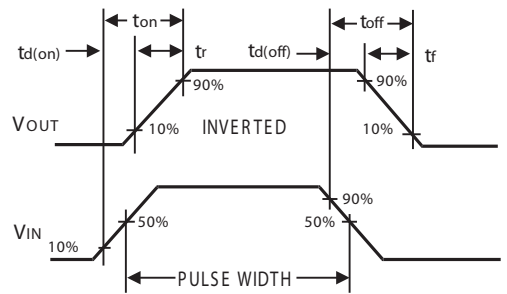


Figure 12. Switching Waveforms

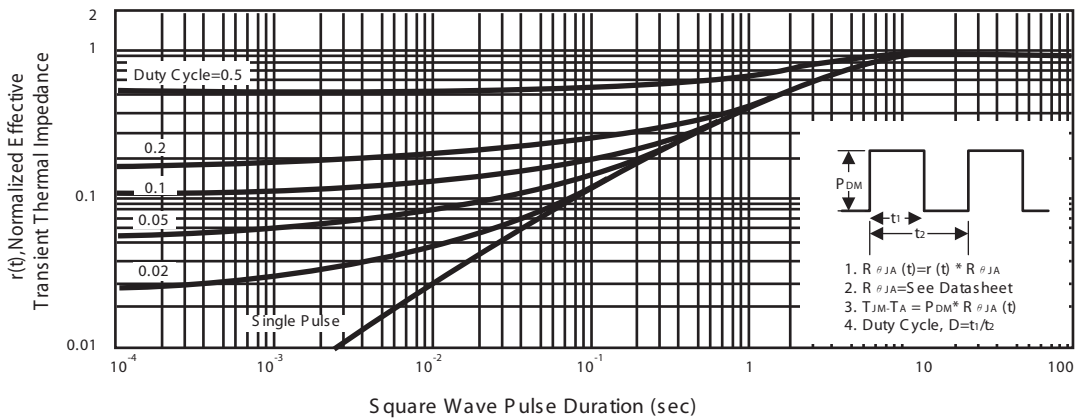


Figure 13. Normalized Thermal Transient Impedance Curve