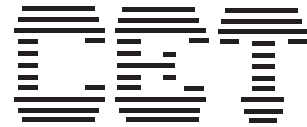


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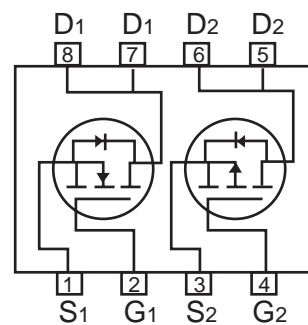
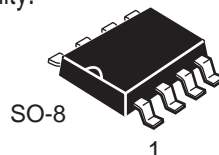
Feb. 2003

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

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### FEATURES

- 30V , 7.5A ,  $R_{DS(ON)}=21m\Omega$  @ $V_{GS}=10V$ .  
 $R_{DS(ON)}=30m\Omega$  @ $V_{GS}=4.5V$ .
- -30V , -5.0A ,  $R_{DS(ON)}=50m\Omega$  @ $V_{GS}=-10V$ .  
 $R_{DS(ON)}=75m\Omega$  @ $V_{GS}=-4.5V$ .
- Super high dense cell design for extremely low  $R_{DS(ON)}$ .
- High power and current handing capability.
- Surface Mount Package.



### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	$V_{DS}$	30	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	$\pm 20$	V
Drain Current-Continuous <sup>a</sup> -Pulsed	$I_D$	$\pm 7.5$	$\pm 5.0$	A
	$I_{DM}$	$\pm 30$	$\pm 20$	A
Drain-Source Diode Forward Current <sup>a</sup>	$I_S$	2.3	-2.3	A
Maximum Power Dissipation <sup>a</sup>	PD	2.0		W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150		$^{\circ}C$

### THERMAL CHARACTERISTICS

Thermal Resistance, Junction-to-Ambient <sup>a</sup>	$R_{\theta JA}$	62.5	$^{\circ}C/W$
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## N-Channel ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25 °C unless otherwise noted)

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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> = 250μA	30			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 30V, 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> = 250μA	1		3	V
Drain-Source On-State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 9A		18	21	mΩ
		V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 7.4A		25	30	mΩ
On-State Drain Current	I <sub>D(on)</sub>	V <sub>DS</sub> = 5V, V <sub>GS</sub> = 10V	15			A
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = 15V, I <sub>D</sub> = 9A		16		S
<b>DYNAMIC CHARACTERISTICS<sup>c</sup></b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V f = 1.0MHz		857		pF
Output Capacitance	C <sub>OSS</sub>			343		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			105		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> = 3.5A, V <sub>GS</sub> = 10V, R <sub>GEN</sub> = 6Ω		22	45	ns
Rise Time	t <sub>r</sub>			34	70	ns
Turn-Off Delay Time	t <sub>D(off)</sub>			43	90	ns
Fall Time	t <sub>f</sub>			18	35	ns
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 15V, I <sub>D</sub> = 4.7A, V <sub>GS</sub> = 10V		28	35	nC
Gate-Source Charge	Q <sub>gs</sub>			4		nC
Gate-Drain Charge	Q <sub>gd</sub>			7.5		nC

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

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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> = 250μA	-30			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = -30V, 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> = -250μA	-1		-3	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> = -10V, I <sub>D</sub> = -4.2A		40	50	mΩ
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -3.4A		65	75	mΩ
On-State Drain Current	I <sub>D(ON)</sub>	V <sub>DS</sub> = -5V, V <sub>GS</sub> = -10V	-15			A
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = -15V, I <sub>D</sub> = -4.2A		7		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		1124		pF
Output Capacitance	C <sub>OSS</sub>			488		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			150		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> = -4.2A, V <sub>GEN</sub> = -10V, R <sub>GEN</sub> = 6Ω		21	40	ns
Rise Time	t <sub>r</sub>			23	45	ns
Turn-Off Delay Time	t <sub>D(OFF)</sub>			33	65	ns
Fall Time	t <sub>f</sub>			60	100	ns
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = -15V, I <sub>D</sub> = -4.2A, V <sub>GS</sub> = -10V		30	36	nC
Gate-Source Charge	Q <sub>gs</sub>			4		nC
Gate-Drain Charge	Q <sub>gd</sub>			7.5		nC

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

Parameter	Symbol	Condition	Min	Typ <sup>c</sup>	Max	Unit
<b>DRAIN-SOURCE DIODE CHARACTERISTICS<sup>b</sup></b>						
Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0\text{V}, I_S = 5.1\text{A}$ N-Ch		0.8	1.2	V
		$V_{GS} = 0\text{V}, I_S = -3.6\text{A}$ P-Ch		-0.8	-1.2	

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### 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

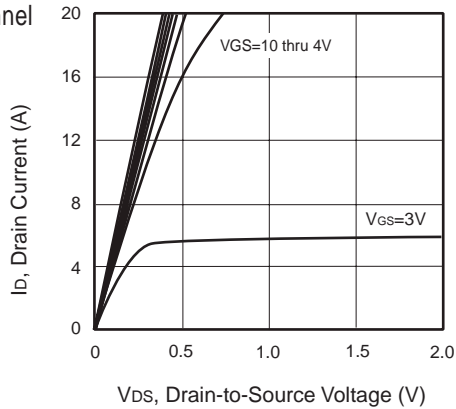


Figure 1. Output Characteristics

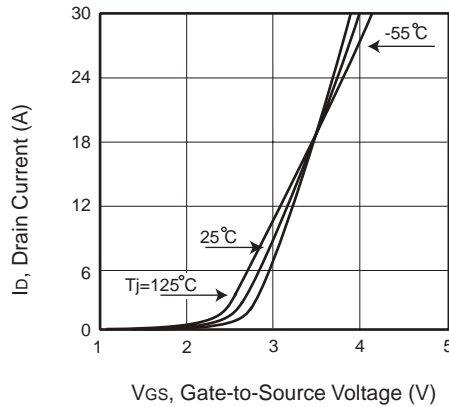


Figure 2. Transfer Characteristics

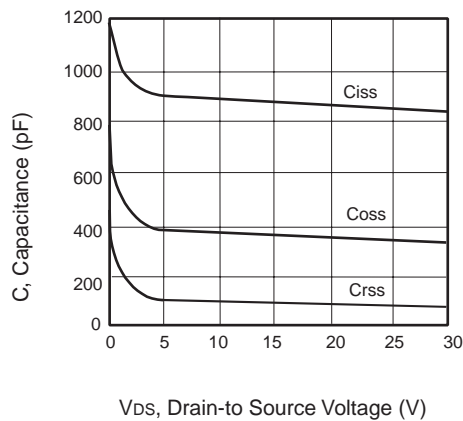


Figure 3. Capacitance

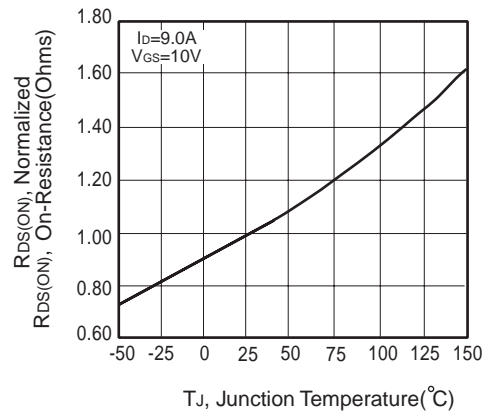
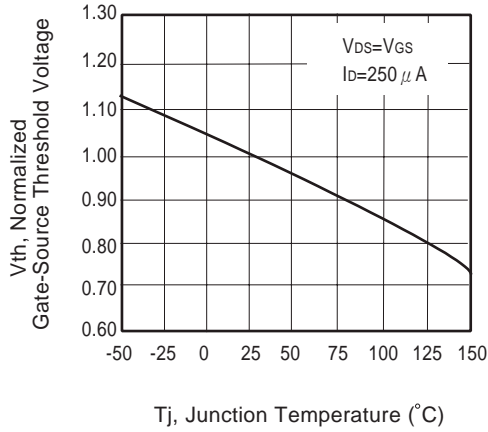


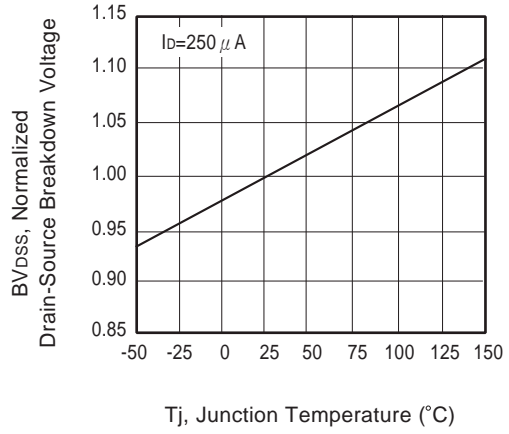
Figure 4. On-Resistance Variation with Temperature

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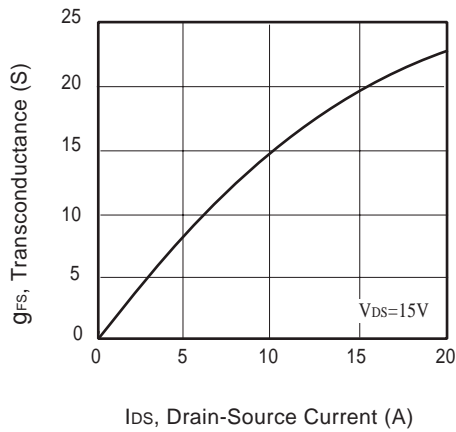
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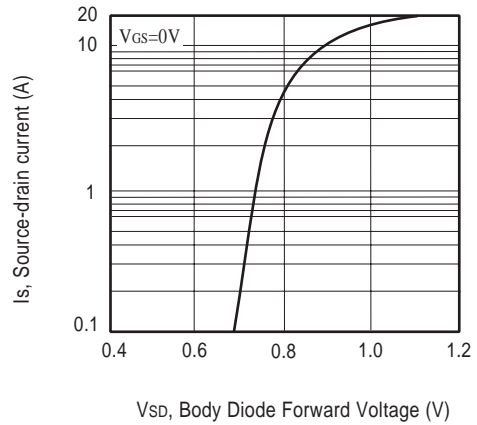
**Figure 5. Gate Threshold Variation with Temperature**



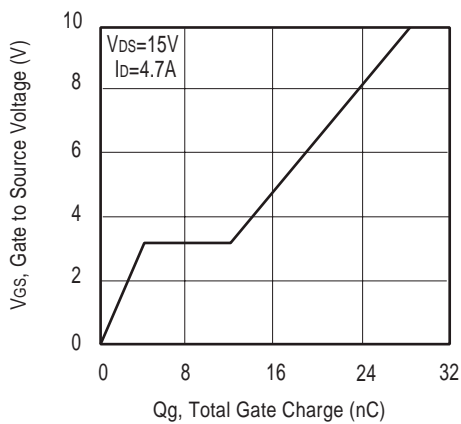
**Figure 6. Breakdown Voltage Variation with Temperature**



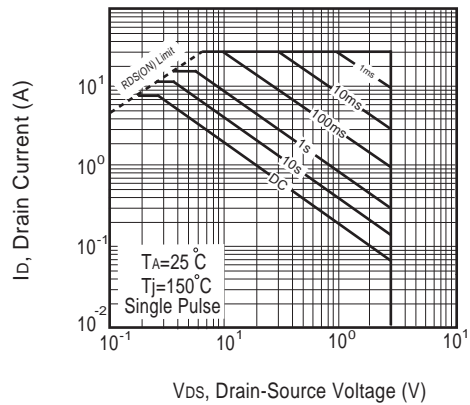
**Figure 7. Transconductance Variation with Drain Current**



**Figure 8. Body Diode Forward Voltage Variation with Source Current**



**Figure 9. Gate Charge**



**Figure 10. Maximum Safe Operating Area**

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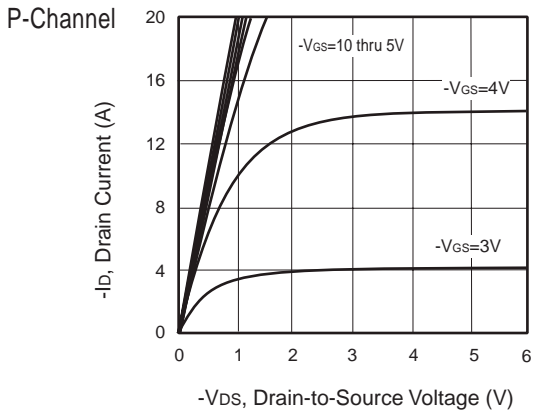


Figure 11. Output Characteristics

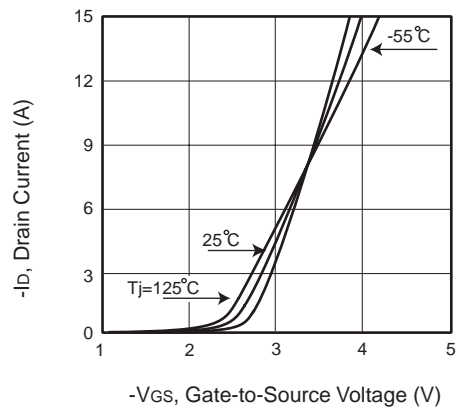


Figure 12. Transfer Characteristics

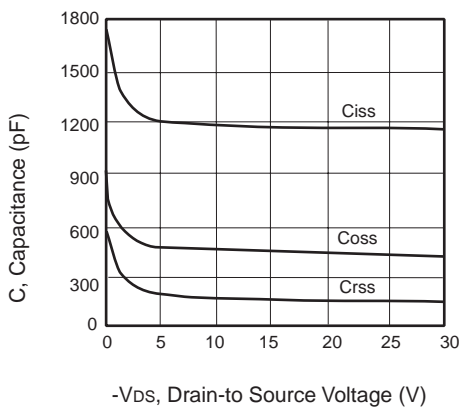


Figure 13. Capacitance

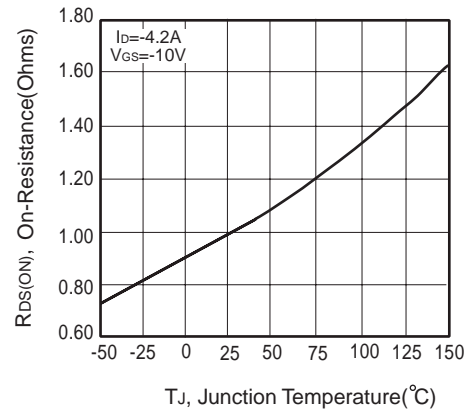


Figure 14. On-Resistance Variation with Temperature

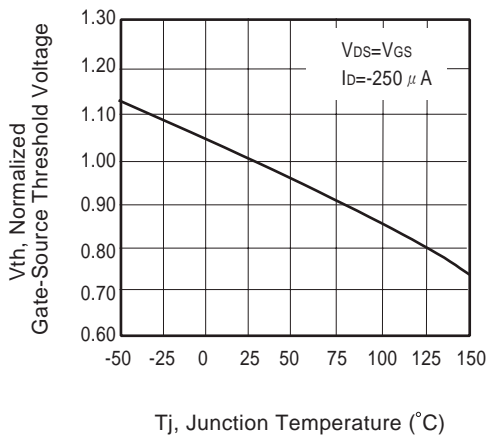


Figure 15. Gate Threshold Variation with Temperature

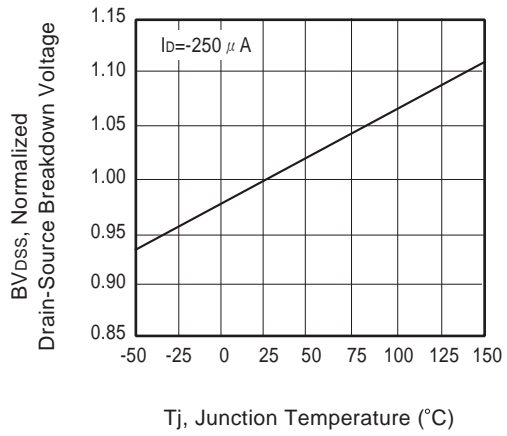


Figure 16. Breakdown Voltage Variation with Temperature

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P-Channel

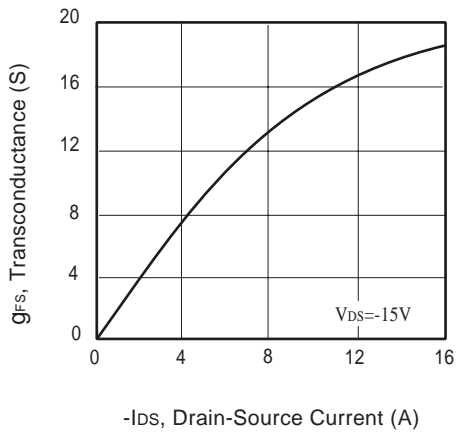


Figure 17. Transconductance Variation with Drain Current

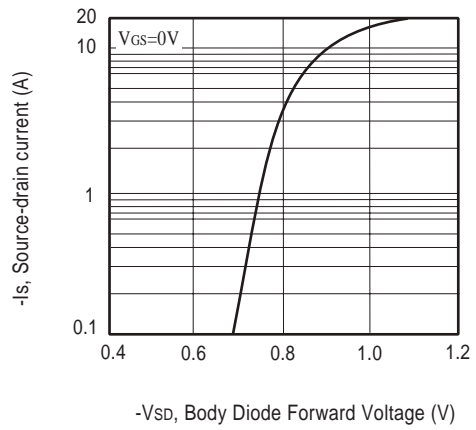


Figure 18. Body Diode Forward Voltage Variation with Source Current

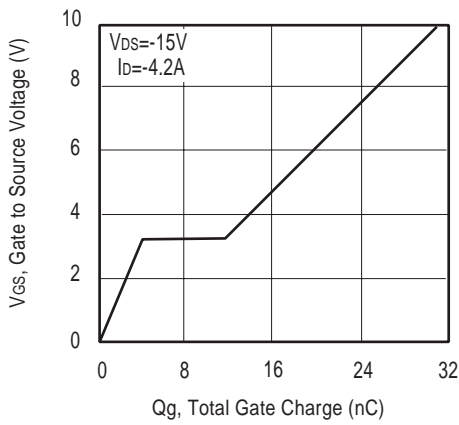


Figure 19. Gate Charge

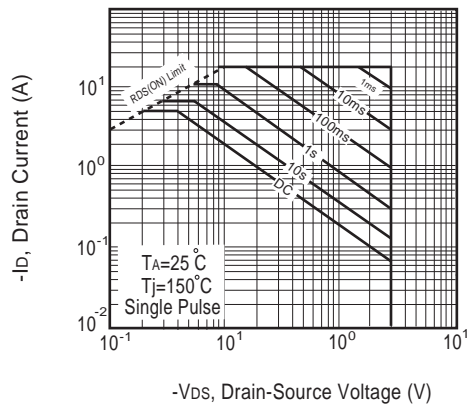


Figure 20. Maximum Safe Operating Area

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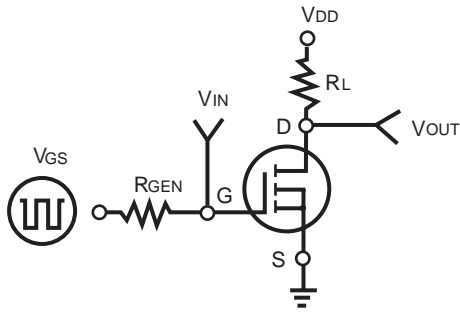


Figure 21. Switching Test Circuit

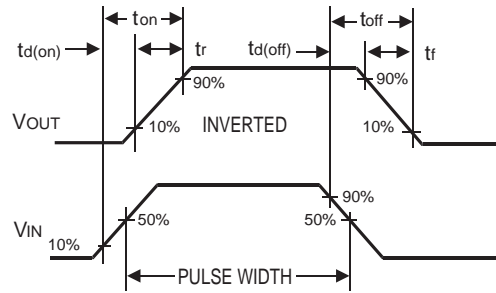


Figure 22. Switching Waveforms

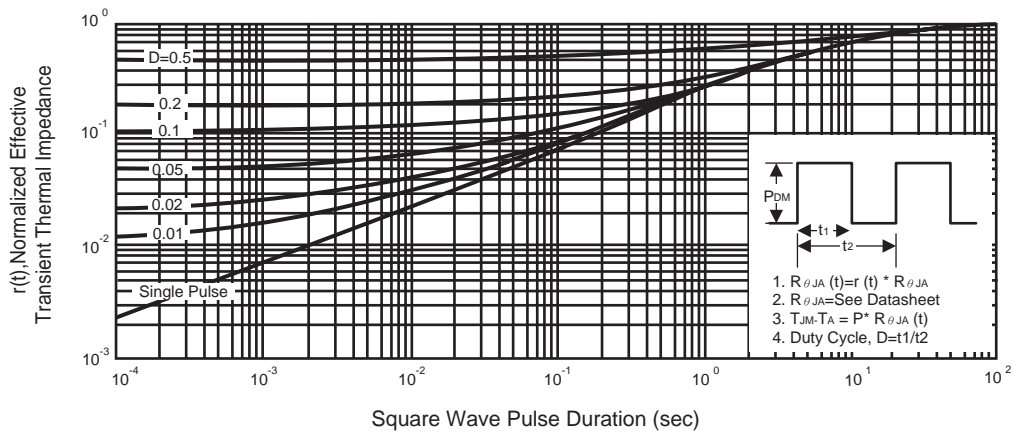


Figure 23. Normalized Thermal Transient Impedance Curve